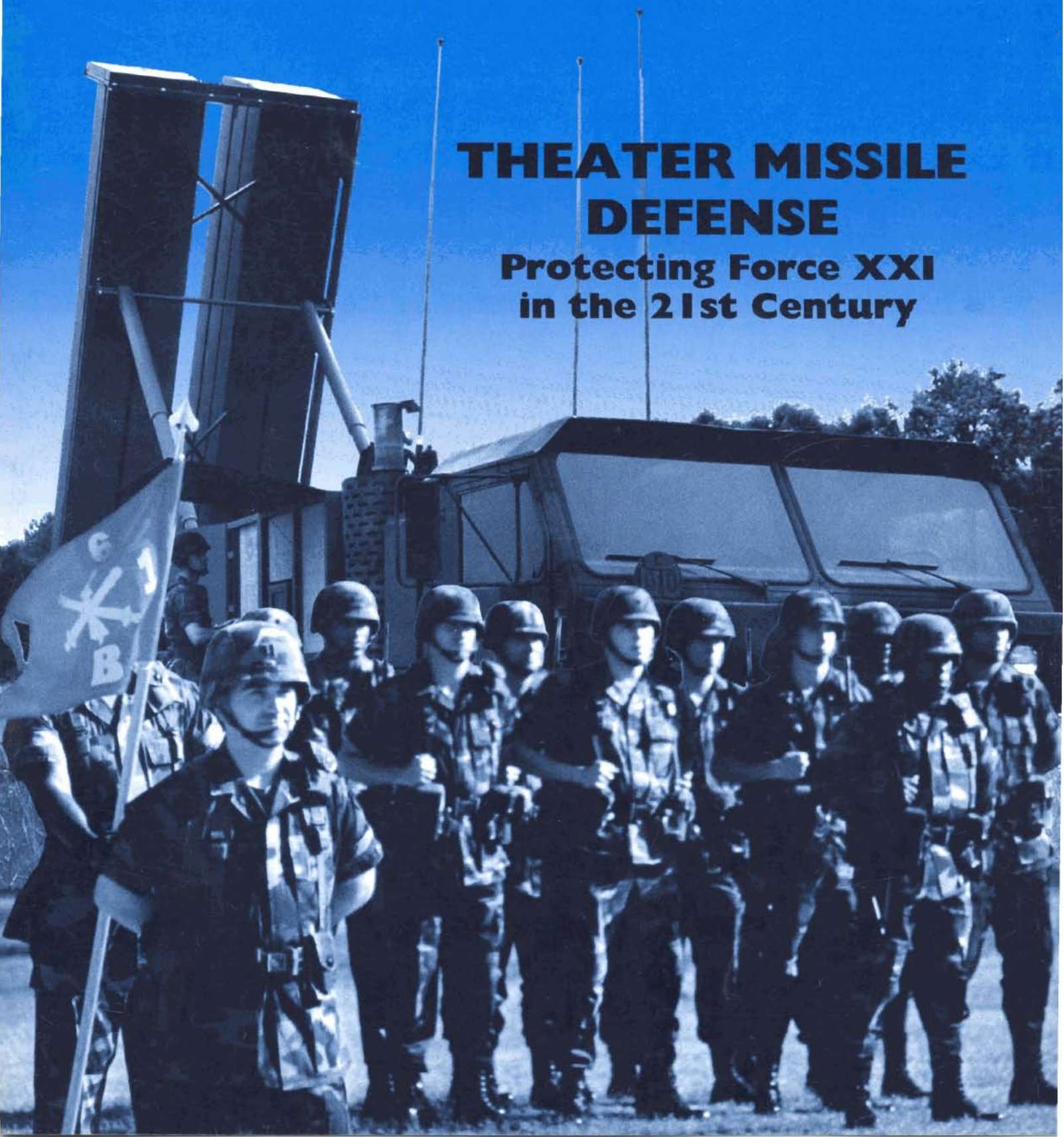




PB 44-95-6 NOVEMBER-DECEMBER

THEATER MISSILE DEFENSE

**Protecting Force XXI
in the 21st Century**





HQDA PB 44-95-6 NOVEMBER-DECEMBER 1995

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CORRECTION

"3-4 ADA Jumps Stinger Missile" by 3-4 ADA executive officer, 1st Lt. Frank Cook, appearing in the September-October 1995 issue was mistakenly attributed to Spec. John G. Valceanu, the Fort Bragg, N.C. public affairs specialist who took the photos that appeared with the article. ADA magazine regrets the error.

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Intercept Point



Well, I have been in the saddle as your chief of Air Defense Artillery for a few months. I have spent a great deal of time on the road, so I am still struggling to learn Fort Bliss. I do know that we are very fortunate to be served by a great group of military and civilian personnel. Fort Bliss, like the rest of the Army, has been significantly downsized, but our commitment to serve ADA soldiers in the field has not diminished. In many areas, things are being done out of sheer loyalty and hard work.

My number one objective since taking command has been to mature the ADA vision and articulate the branch's role in the Army of the 21st century. We will have the opportunity to present our plan to the Army's senior leadership when we brief the vice chief of staff in December. You'd best believe that elbow grease is in short supply, as is midnight oil, as your schoolhouse constructs the ADA road map to the future.

As we put the vision and plan together, my highest near-term priority is to reduce the turmoil in the ranks of our Patriot soldiers.

National defense priorities, as well as wartime contingencies, frequently demand that certain units bear an unfair share of the burden. This is a hard reality that all soldiers recognize and understand. But seldom have soldiers been called on to shoulder such a heavy burden for such a long time as our Patriot soldiers. As our only line of defense against theater ballistic missiles, Patriot soldiers are justifiably proud of the tremendously important geopolitical role they play, but the hardships imposed by frequent deployments and family separation have begun to take their inevitable toll.

I saw this problem coming when, as commanding general of the 32nd Army Air Defense Command, I sent soldiers on numerous trips to Southwest Asia. Subsequent deployments to Korea, the move of the 108th ADA Brigade to Fort Bliss, Patriot Advanced Capabilities-3 (PAC-3) testing and other factors have led to an "oversubscription" of the Patriot force. In other words, we have too many requirements and too little capability.

I want you to know that I am personally working this problem. We have received superb support from the Army personnel community from top to bottom, and I am working a solution. Bear with me as I attempt to lower the requirement and raise our ability to meet it. I personally can't move fast enough, but I also understand that the system cannot react overnight. Hope to share with you details of an approved plan in the next installment of "Intercept Point."

You ladies and gentlemen in the field are doing great things. Hang in there and maintain the standard.

ADA 06 . . . out!

*Maj. Gen. John Costello
Chief, Air Defense Artillery*

We deployed six Patriot batteries to South Korea. We deployed four batteries to Saudi Arabia. When the call came to deploy, we were ready. The Army has broken the mold of not being ready. In our nation's past, five years after a war, the Army could not do what we do now routinely — move ready, capable units at a moment's notice. That is deterrence.

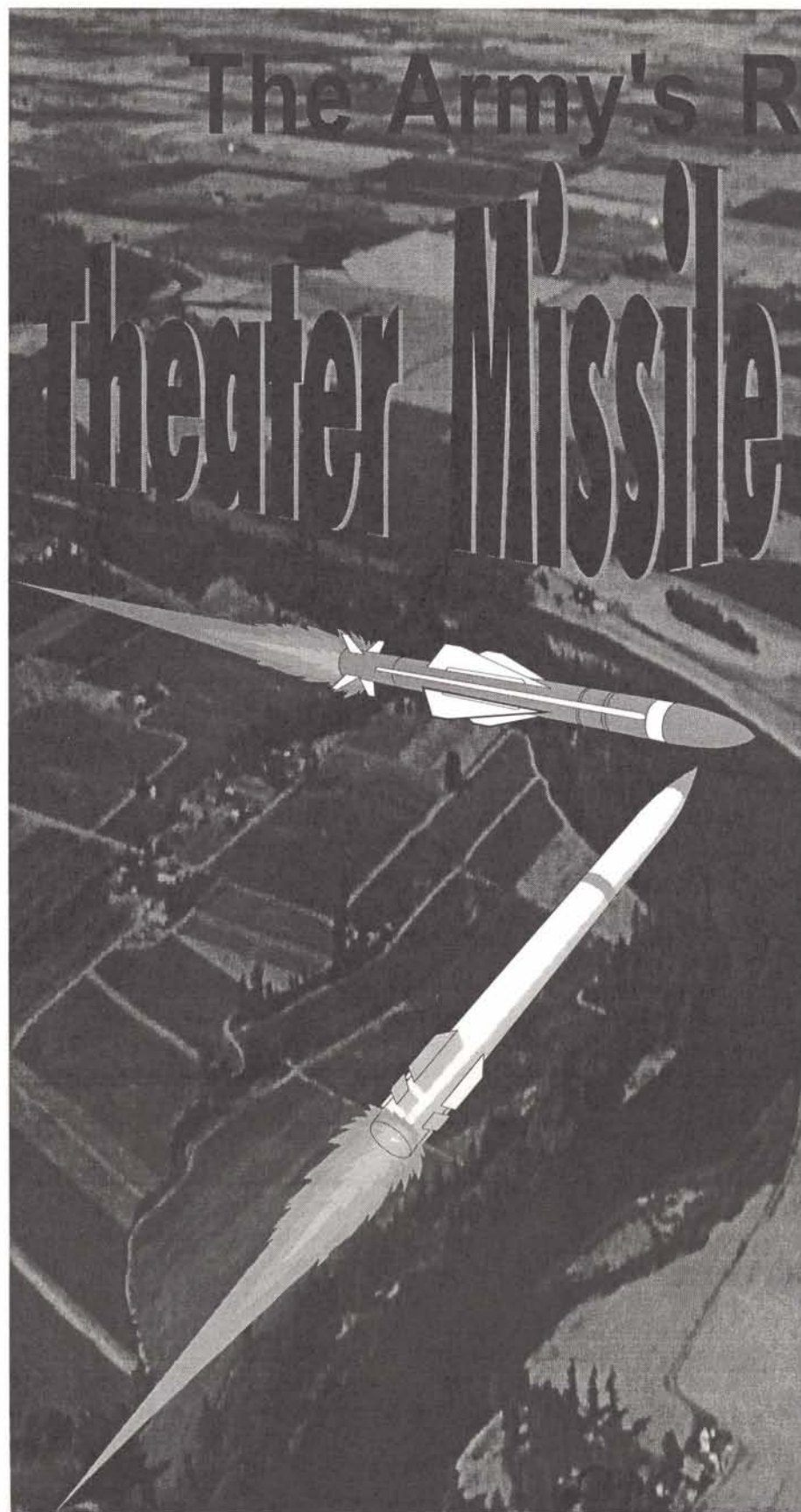
*Gen. Gordon R. Sullivan,
Army Chief of Staff, 1994*

At the moment, the South is largely vulnerable to attack by North Korean Scud missile derivatives. Only U.S. Patriot batteries could be called up to deliver a credible defense.

International Defense Review

The military of the present is dominated by the carrier pilot, the fighter jock, the tanker; the military of the future may be dominated by the computer wizard, the missileer, or the specialist in remote combat who does not yet even have a title.

*Eliot A. Cohen, "Come the Revolution," National Review,
July 31, 1995*



The Army's Role in Theater Missile Defense

by Lt. Col. Frank J. Caravella

Introduction

Theater missile defense developments underway before the Persian Gulf War gained significant momentum as a result of Iraq's use of missiles and threatened use of mass casualty warheads in that conflict. The president announced, during his January 1991 State of the Union address, that the Strategic Defense Initiative program would be refocused on providing a missile defense system to protect the United States, its forces deployed abroad, and friends and allies against accidental, unauthorized or limited ballistic missile strikes. Congress supported this proclamation by mandating deployment goals for both national and theater missile defense in the Missile Defense Act of 1991. These goals specifically provided the following direction for the development and fielding of theater missile defenses:

- Aggressively pursue the development of advanced theater missile defense systems with the objective of selecting and deploying such systems by the mid-1990s.
- Develop deployable and rapidly relocatable advanced theater

missile defenses that are capable of defending forward-deployed and expeditionary elements of the armed forces of the United States.

- Cooperate with friendly and allied nations in the development of theater defenses against theater or tactical ballistic missiles (TBM).

The goals established by the congressional leadership have focused the Army's efforts in missile defense efforts and resulted in significant progress in the nation's defense against these threats. This article provides an overview of theater missile and air defense, including discussions on threats to be countered, the components of theater missile defense, theater missile defense lessons learned from Desert Storm, contributions of the joint service participants, and the Army's role in theater missile defense.

Threat

The missile threat to U.S. forces around the globe is significant and growing. The theater missile threat includes ballistic missiles, cruise

missiles and air-to-surface guided missiles. Tactical ballistic missiles, even when used in small numbers, may be a significant campaign factor. Gen. H. Normal Schwarzkopf knew the Iraqi Scud threat was militarily insignificant; however, these weapons challenged the cohesiveness of the coalition. Clearly, a more numerous or effective ballistic missile capability in the hands of a determined adversary could have had both military and geopolitical effects. Additionally, cruise and air-to-surface missile technology is for sale today and will proliferate throughout the 1990s. Such missiles present a growing threat to deploying U.S. forces and our allies.

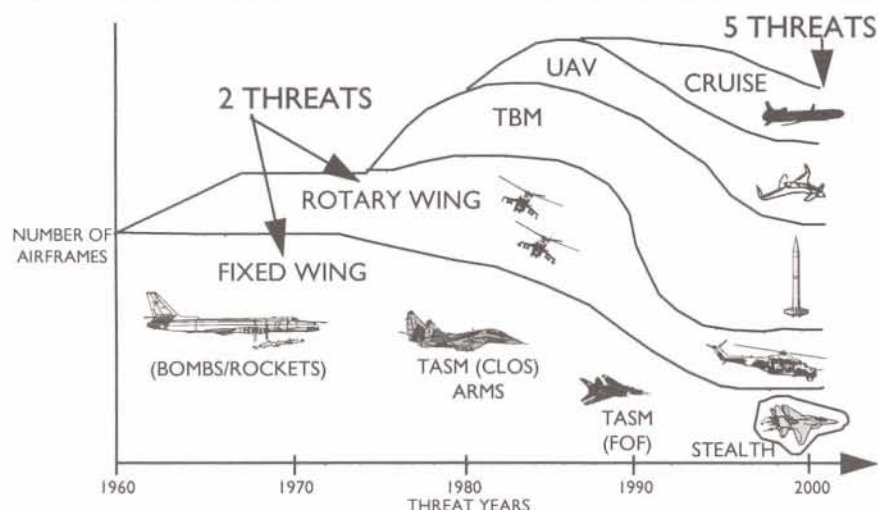
The psychological effect of TBMs was proven during Operations Desert Shield and Storm. Despite the inaccuracies of the Iraqi versions of the Scud missile, they caused the theater commander to consider the threat to nonmilitary targets and devote significant resources to the defense of these geopolitical assets.

Currently, more than 25 countries have some TBM capability, with that number expected to increase significantly by the end of the decade. Effective defense against TBMs is complicated by the wide variety of TBMs available — from relatively short-range, low-trajectory missiles to missiles with ranges measured in thousands of kilometers and very high-altitude trajectories. Additionally, the growing variety of potential warheads these missiles may carry further challenges our ability to counter them.

If uncountered, TBMs, particularly those armed with mass casualty warheads, place limits on U.S. national military strategy options. Our ability to project U.S. forces in contingency theaters is threatened by these short-range missiles with mass casualty warheads. Our forces are most vulnerable during the early phases of entry and lodgement operations. To avoid disaster, deploying U.S. forces must possess the inherent means necessary to defend themselves against this threat.

The United States' success with its Tomahawks in Operation Desert Storm validated the tactical and operational effectiveness of cruise missiles on the battlefield. Russia, France and the United States are but a few of the countries that currently produce cruise missiles. Several other countries possess the technology to produce airframes for cruise missiles and to purchase avionics and homing packages to build a significant threat. Developing nations with sufficient cash can obtain the experience and technology necessary to build their own systems. The expense of operating and maintaining an air force can be reduced by the use of cruise missiles capable of delivering mass casualty warheads. Technologies to improve accuracy, such as receivers for the global positioning system, can be purchased for less than \$1,000.

WORLDWIDE AIR THREAT TRENDS



Cruise missiles may be ground-, air- or sea-launched. Their inherently low radar cross section, in combination with the variety of terminal guidance packages such as anti-radiation homing and low-cost inertial guidance, creates a formidable challenge to defenses. The level of difficulty involved in detecting cruise missile launch and flight and killing the missiles at extended ranges makes them a most difficult air defense threat.

Generally smaller and of shorter range than the closely related cruise missile, precision-guided tactical air-to-surface missiles may be launched by a variety of aircraft. These missiles depend on accuracy in targeting and fire control to be effective because of their inherently small warheads. Their variety of seeker options include electro-optical, infrared homing, antiradiation homing and command line of sight. Because of their low radar cross section and high speeds, tactical air-to-surface missiles are particularly difficult targets to detect, track and engage. Of special interest to ground-based air defenses is the antiradiation missile, a member of the tactical air-to-surface missile family that poses a significant threat to radars on the battlefield.

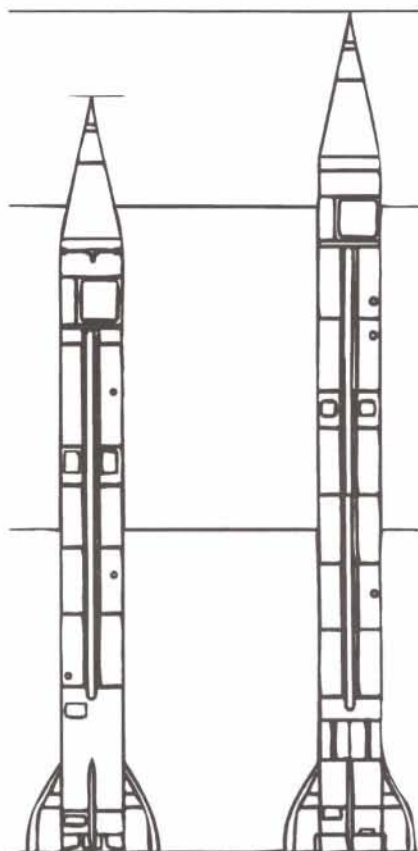
Twenty-first century improvements to theater missiles will include increased range and accuracy, the introduction of maneuvering warheads, terminally guided submunitions and penetration aids on ballistic missiles, increases in nuclear warhead quantities and yields, increases in submunition warheads, and the introduction of specialized warheads. Additional sophistication in adversarial countries' armed forces could result in attack raids using precise timing or saturation techniques in an attempt to overwhelm theater missile defenses.

To further complicate the potential warfight, the proliferation of high technology has accentuated national unpredictabilities. An ally can become neutral or even hostile literally

overnight. This significantly complicates the military planning process, because we can predict neither when nor where U.S. forces may be required. Additionally, since we cannot predict who our next foe may be, we cannot accurately predict what equipment or doctrine he will use or the force we will require in a specific conflict.

In the past, because East-West competition dominated regional conflicts, we could generally assume that potential foes would employ Soviet-style doctrine and Soviet-supplied equipment. This is no longer true. An opposing force's doctrine may be based upon Soviet, American or Third World country operational art. Threat commanders will employ various tactics and techniques to defeat Army units and accomplish the mission in support of an overall enemy campaign. For example, the threat will

The illustration below portrays the missile size difference between the SS-1c 'Scud B', on the left, and the Al-Husayn, on the right.



use unmanned aerial vehicles for a variety of reconnaissance, intelligence, surveillance and target acquisition activities, including the "eyes" to provide theater ballistic missiles, cruise missiles and artillery systems near-real-time, accurate targeting data. These tactics and techniques may include attacks from multiple altitudes and employment of electronic countermeasures and antiradiation missiles against ADA units and systems. Additionally, any country, agency or group finding a particular technology useful may purchase it and use it as a formal means of warfare or as part of a terrorist program. This wide variety of potential adversaries means that the Army must be prepared to fight in any theater, against multiple equipment mixes, employing a wide variety of tactics and procedures. The challenge is formidable.

Warfighting Overview

The overall mission of theater missile defense is to protect deployed U.S. forces, U.S. allies and other important countries, including areas of vital interest to the United States, from theater missile attacks. The specific objectives of theater missile defense are —

- *deter* hostile nations from employing theater missiles;
- *prevent* launch of theater missiles against U.S. forces, U.S. allies and other strategically important countries, including areas of vital interest;
- *protect* U.S. forces, U.S. allies, other strategically important countries and areas of vital interest from theater missiles launched against them;
- *reduce* the probability and minimize the effects of damage caused by a theater missile attack; and
- *detect, warn and report* of theater missile launch.

The Joint Tactical Missile Defense Operational Concept (approved April 4, 1988) described theater missile defense operations in terms of four con-

cept elements or "pillars." The broad range of capabilities required to execute theater missile defense operations were subsequently documented in the mission need statement for theater missile defense (Nov. 18, 1991, JROCM-064-91). The theater missile defense operations concept elements are attack operations, active defense, passive defense and command, control, communications, computers and intelligence (C⁴I).

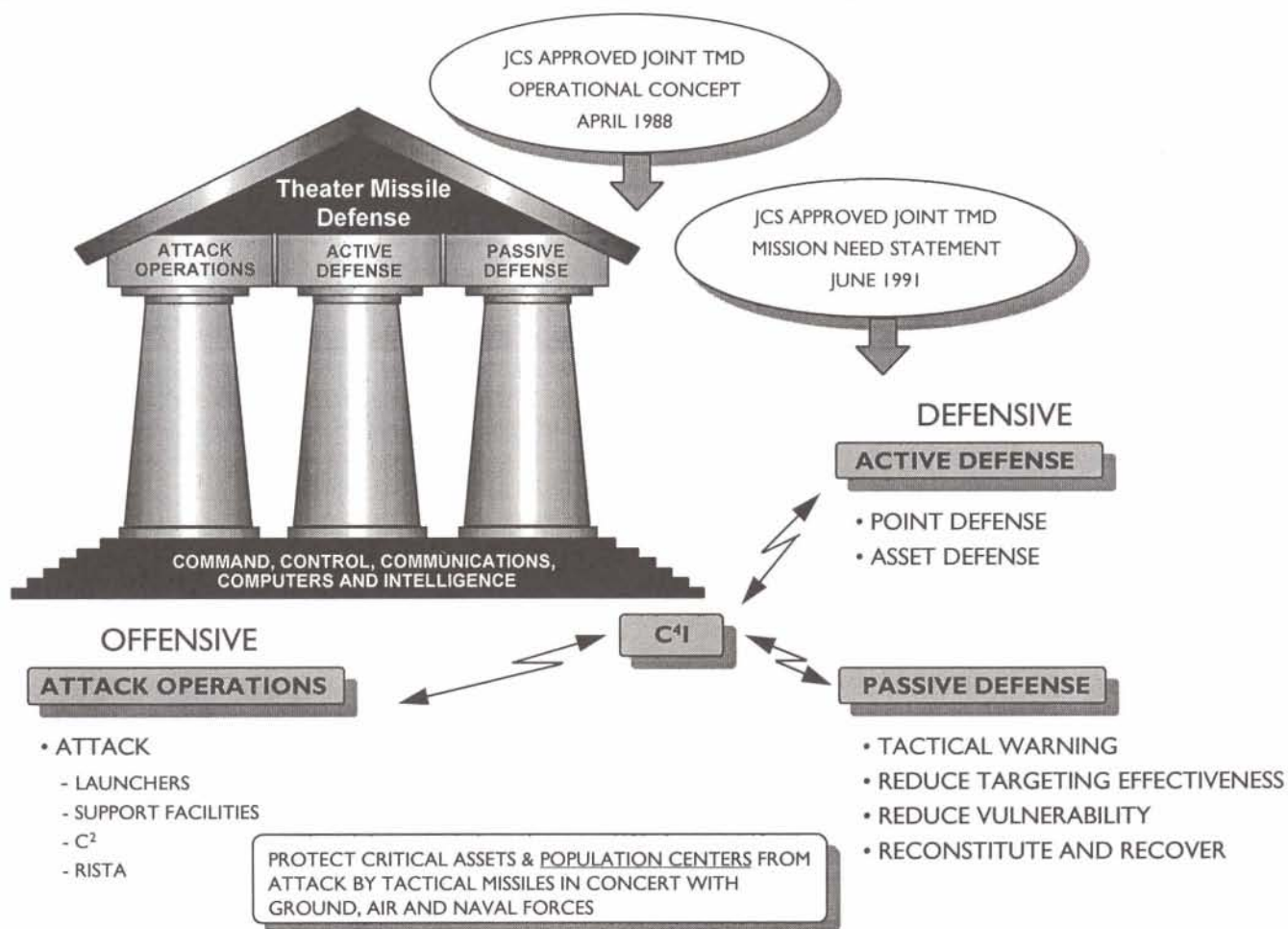
Key aspects of each of these concept elements, or "pillars" are described in the following paragraphs. The relationship among the four pillars of the theater missile defense concept is depicted in the Theater Missile Defense Operational Concept illustration.

Attack operations attempt to prevent launch of theater missiles by attacking launchers and by using battle management (BM)/C⁴I facilities; reconnaissance, intelligence, surveillance and target acquisition platforms; and logistics support structures. Attack operations include actions of space, air, ground, maritime and special operations forces. These operations are generally focused beyond the fire support coordination line and entail considerable joint planning with the U.S. Air Force and/or joint force air component commander. Army means — attack helicopters and the Army tactical missile system — will be used to attack deep targets in the ground commander's area of interest. Deep targets could include enemy theater missile operations.

Active defense operations provide protection by destroying missiles in flight. An active defense capability protects critical resources from theater missile attack and adds uncertainty to enemy planning by reducing the effects on those forces and assets essential to seizing and maintaining the initiative in the land and air campaigns. Today and for the foreseeable future, such defense is accomplished solely by surface-based systems. Patriot currently represents our national command authority's only active defense capability.

Passive defense measures protect combat forces and assets by reducing the probability and minimizing the effects of theater missile attacks. These efforts degrade the enemy's ability to

THEATER MISSILE DEFENSE OPERATIONAL CONCEPT



target U.S. and allied forces and facilities, reduce vulnerability to attack and provide for rapid reconstitution and recovery of forces should attack operations and active defense fail. Passive defense includes alerting of the force, dispersal, redundancy, hardening and improving mobility. All services participate in passive defense efforts and executing these measures is the responsibility of unit commanders at each echelon.

The C⁴I pillar links the other three efforts into a coherent whole through coordinated attack operations, active defense designs and passive defense planning. Theater missile defense C⁴I is conducted simultaneously with and integrated into other operations according to

joint and combined doctrine and procedures.

Desert Storm Lessons Learned

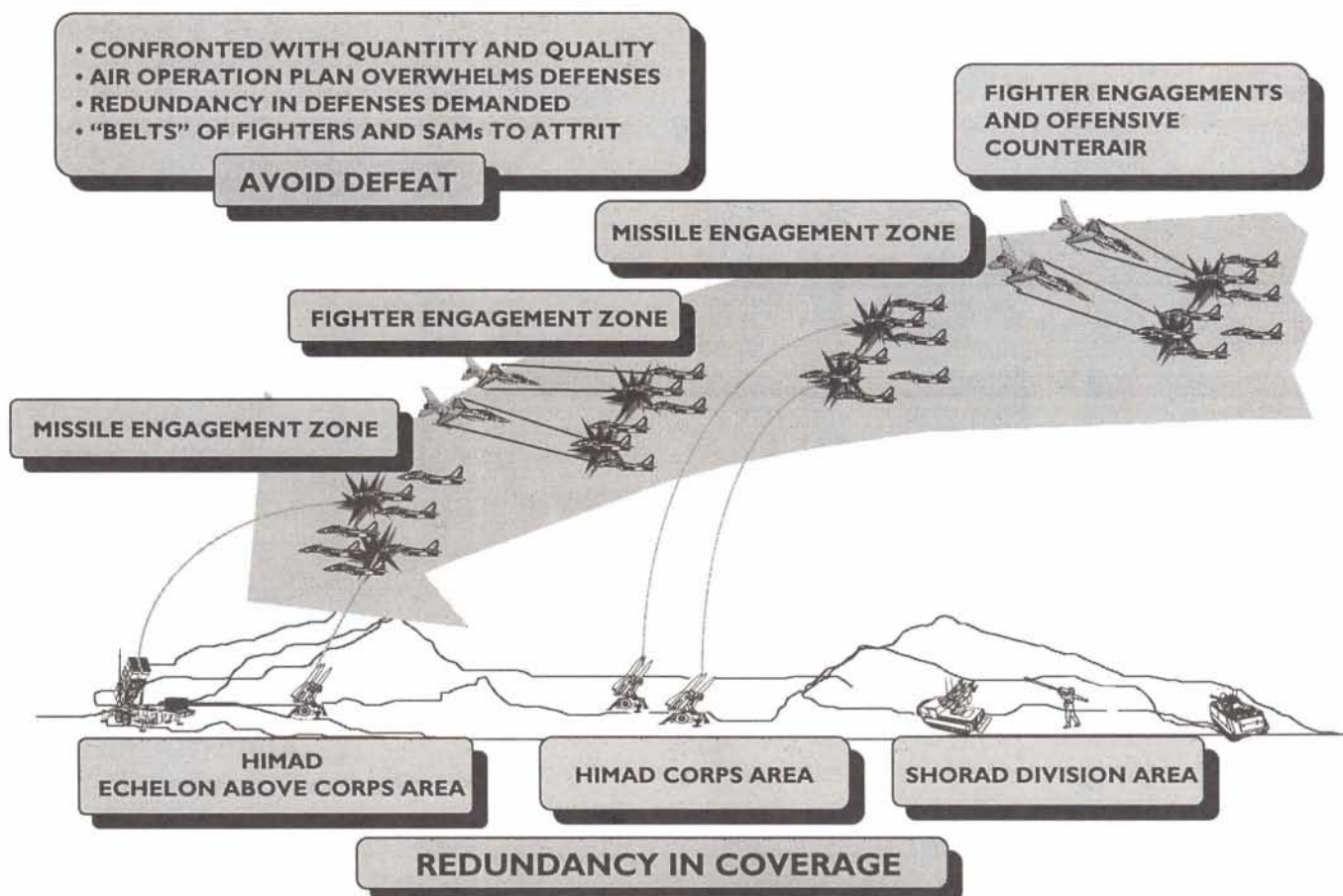
Operation Desert Storm recorded the first theater missile defense combat operations by U.S. forces as the Iraqis let the "theater missile genie" out of the bottle. The validity of the four-pillar operational concept was confirmed. The attempted suppression and defeat of Iraqi missiles, however, was only accomplished at great cost and difficulty. It required a joint mix of attack operations, active and passive defense measures and the support of national and theater C⁴I capabilities. All pillars of the concept were essential and each component achieved varying levels

of success. The following lessons learned from the conflict generated increased U.S. commitments to theater missile defense on a national level as well as by all military services and numerous defense agencies:

- TBMs — even inaccurate TBMs — in the hands of any regional power that also possesses unconventional warheads can seriously disrupt political and military plans and operations.

- U.S. capabilities were on the "ragged edge" against much of the world's TBM inventory and essentially nonexistent against unconventional warheads. Desert Storm also affirmed the need for a wider vital asset defense capability, a mission for

COLD WAR CONCEPT



which Patriot was not initially designed.

• Joint force theater missile defense operations are costly. More than 3,000 air sorties were flown during a 43-day period to attack missile launch operations and infrastructure. Twenty-seven U.S. Patriot fire batteries (which at the time were 75 percent of all available Patriot batteries), two Dutch and two Israeli units deployed to protect key operational and logistical facilities, population centers and troop concentrations. Numerous Army chemical and biological units deployed to protect our forces against possible chemical and biological attacks.

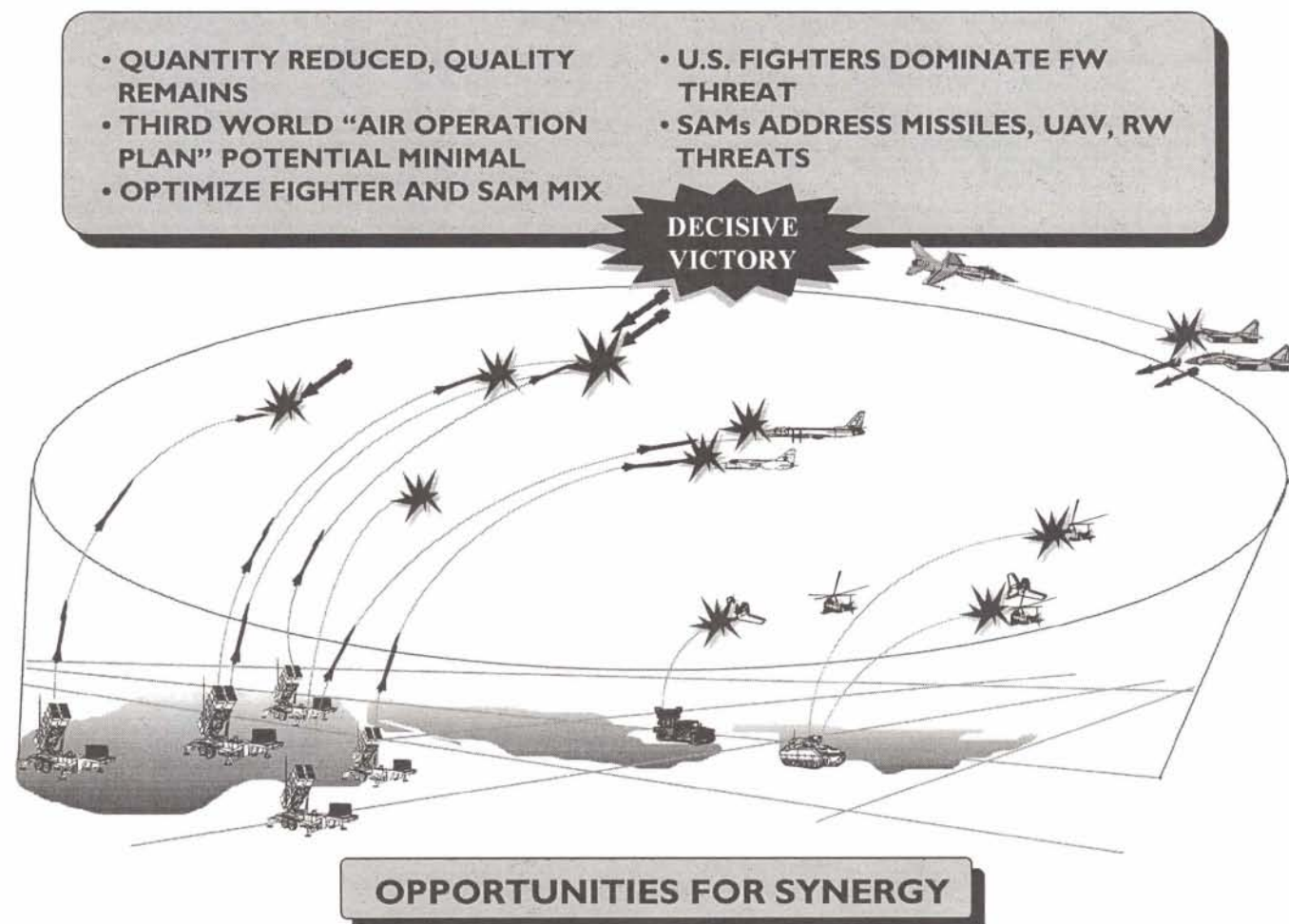
• Joint theater missile defense operations require considerable external support. Desert Storm operations used national C⁴I means for warning, intelligence and targeting; Transportation Command's air and sea lift; and Space Command's tactical warning/attack assessment system to warn of missile attacks on geopolitical and military assets.

Striving for Synergy

To counter the spectrum of aerial threats, current initiatives are built on the realization that synergy must be the overall goal of the services' air and missile de-

fense efforts. As such, air- and ground-based air defenses seek efficiency by avoiding duplication. The threat's nature helps to avoid redundancy. Air threat technologies confronting the joint force today are divided into those best addressed by manned aircraft and, without denigrating the capabilities of our air arms, those best countered by ground-based systems. The shift from the Cold War approach to our current emphasis on leveraging joint capabilities to the maximum extent possible is illustrated by comparison of the Cold War Concept on the previous page and the Post-Cold War Concept below. The Post-Cold

POST-COLDWAR CONCEPT



War Concept illustration shows ground-based systems countering ballistic and cruise missiles, helicopters and unmanned aerial vehicles as well as platforms employing stealth techniques.

The challenge for unmanned aircraft is two-fold: physics and doctrine. Manned aircraft are inappropriate platforms to counter TBMs in the terminal phase due to detection difficulties and inadequate kill potential. Cruise missiles, particularly low-altitude missiles, are difficult to detect and kill due to the clutter of the earth background when viewed from an aircraft.

Unmanned aerial vehicles and helicopter threats operate at altitudes and locations where air-to-air combat is doctrinally avoided. These threat platforms are more readily countered by ground-based systems.

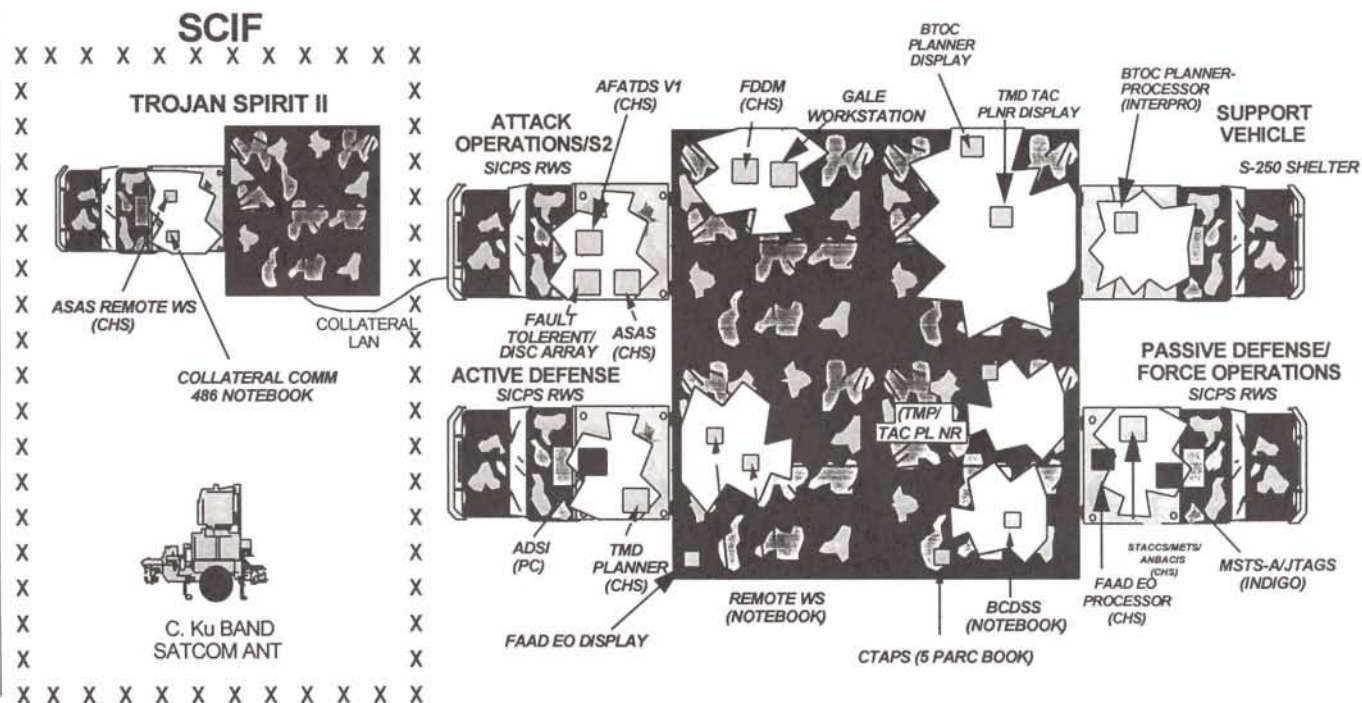
Army Theater Missile Defense Element (ATMDE)

A new innovation in Army TMD operations is the ATMDE. This advanced tactical operations center (TOC) is a mobile, self-contained theater-level element with the principal functions of planning, coordinating and deconflicting the execution of integrated Army TMD operations. It provides the land component commander a rapidly deployable command and control capability to plan and direct TMD operations. The ATMDE is transportable in a single C-141 military aircraft and uses standard Army and joint command and control subsystems. The ATMDE integrates all elements of TMD (C⁴I, attack operations, active defense and passive defense) to provide the land component commander a complete capability throughout all force projection phases.

C⁴I. Equipped with a variety of communications, computer and intelligence capabilities, the ATMDE can remotely deploy or collocate with the Army component headquarters, thereby assisting in horizontal integration of TMD operations with other component commanders. Intelligence support consists of a Trojan Spirit II, an attack operations analysis cell for targeting and analysis, and an intelligence operations cell. Together these cells provide the intelligence functions for indications and warning on threat activities, intelligence preparation of the battlefield, situation development, target development and targeting, and battle damage assessment. They are supported by the Analysis and Control Element and the echelons above corps Military Intelligence brigade.

Attack Operations. The ATMDE provides timely attack information on TBM and cruise missile infrastruc-

TMD POWER PROJECTION TOC



ture to the commander across all TMD elements. The ATMDE, if required, can control attack operations assets until normal corps-level attack command and control assets are in theater and are operational. The ATMDE fuses and synchronizes battlefield situation information and displays status, location and engagement capabilities of the "shooter." During combat operations, the ATMDE spotlights TMD targets to the deep operations coordination cell and deploys liaison officers to enhance coordination and communications between key attack operations nodes.

Active Defense. The ATMDE provides the commander the capability to have situational awareness of the active defense force, status, locations and engagement capabilities. The primary benefit of the ATMDE for the active defense force is the ability to help synchronize echelon above corps ADA battlefield geometry with the ma-

neuver plan and ensure the commander is provided the relevant air picture. If required, integration of TMD active defense priorities and capabilities with other air defense plans and operations at the theater level can be accomplished by ATMDE.

Passive Defense. The ATMDE provides timely, focused warning of theater missile events to U.S. and allied forces. It can provide predicated impact points of TBMs as part of a ballistic missile event. It also provides the capability to assess vulnerability, recuperability and survivability of theater assets and recommends inputs to the high priority target list for attack operations. The ATMDE can coordinate post-strike NBC assessment and coordinate medical support for affected areas.

Lt. Gen. Jay Garner describes the ATMDE's successful operational debut during Roving Sands '95 in "Force

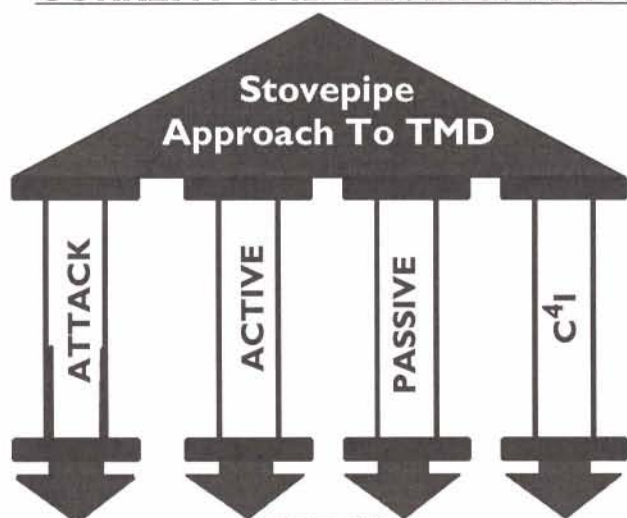
Projection: A Command and Control Solution" on page --. The ATMDE executed TMD operations in early entry and coordinating those activities as the theater matured. The ATMDE provided the land component commander the necessary information to effectively fight the theater missile battle. With the modernization of our forces the ATMDE provides the Army with a TMD force projection capability to support Force XXI operations.

Theater Missile Defense-Advanced Warfighting Experiment (TMD-AWE)

Since the end of the Persian Gulf War, the Army has taken the intellectual and materiel high ground to develop sound solutions to the theater missile defense dilemma. With the help of the Ballistic Missile Defense Organization (BMDO), the

THEATER MISSILE DEFENSE DEVELOPMENT APPROACHES

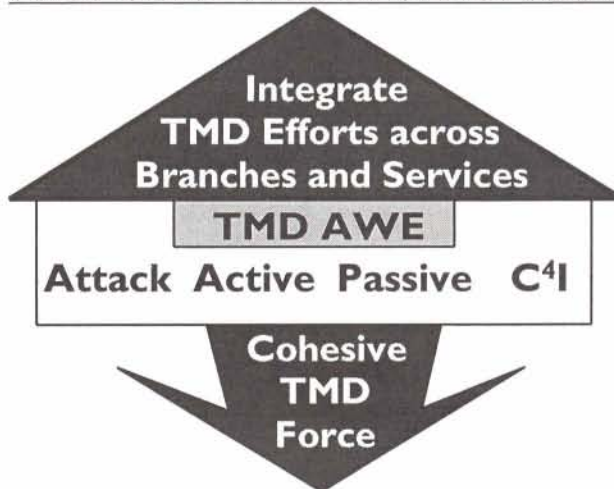
CURRENT TMD DEVELOPMENT



- Stovepipes
- Not Well Integrated
- Passive Defense Architecture Not Well Defined

• **Forces at Risk**

PROPOSED TMD DEVELOPMENT



- Seamless
- Synergistic
- Integrated

• **Forces Protected**

ARMY LEADERSHIP RECOGNIZES THE NEED TO DEVELOP HOLISTIC APPROACH TO TMD ... TMD AWE IS DESIGNED TO RESPOND

Army has upgraded the Patriot anti-missile capability and complemented it with the Theater High-Altitude Area Defense System in this decade. However, current theater missile defense development has a stovepipe approach that places our deployed forces at risk. The Army leadership recognizes the need to develop a holistic approach to theater missile defense.

In response to this need, the Army is conducting a theater missile defense advanced warfighting experiment. The theater missile defense advanced warfighting experiment is a complex, joint and combined experiment with multiple players. Specifically, the theater missile de-

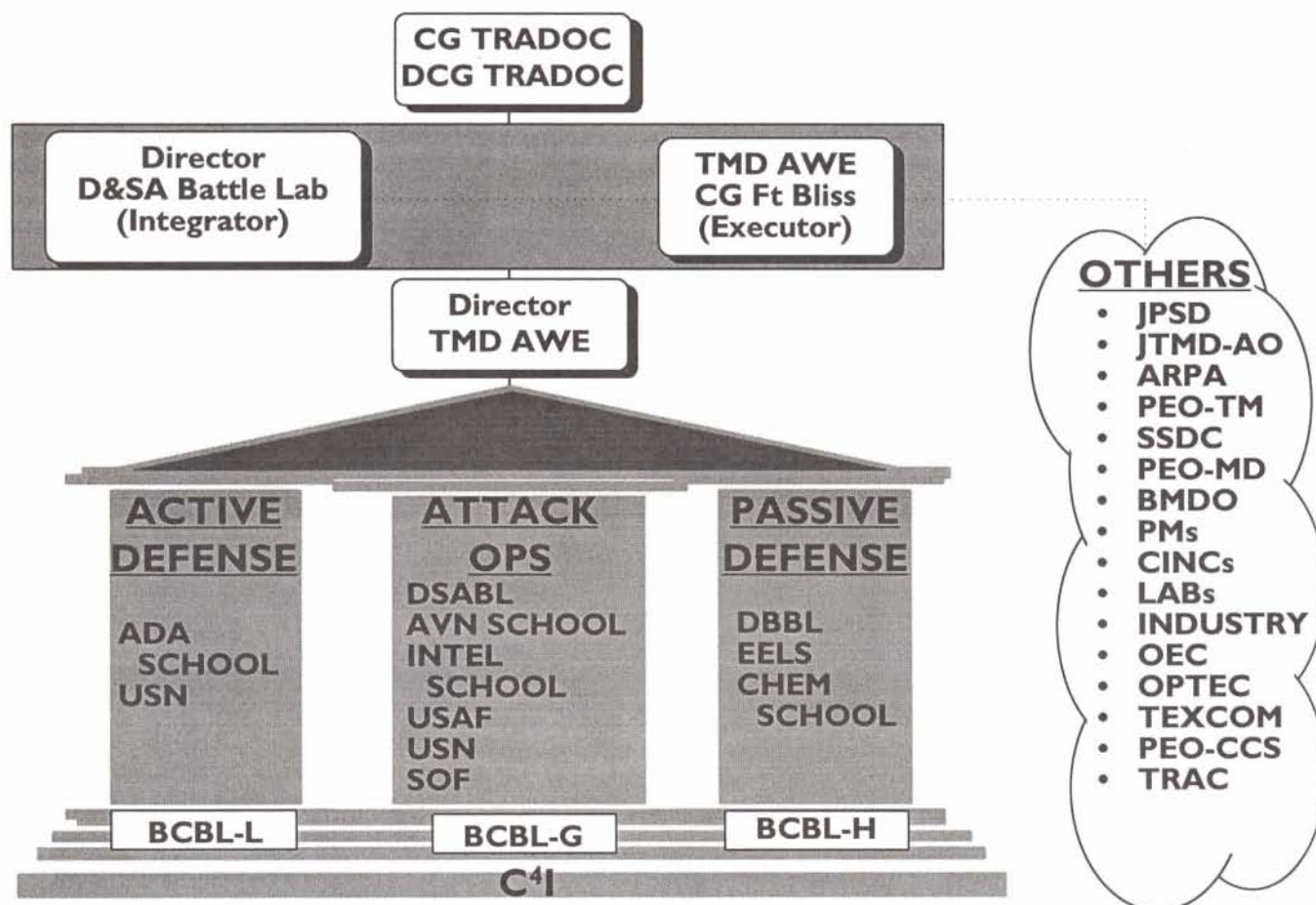
fense advanced warfighting experiment's goal is to prove that:

If... national, joint and Army capabilities are integrated into a cohesive tactical missile defense force that counters the enemy across multiple phases of operations (pre-attack, attack and post-attack) by melding attack operations, active defense and passive defense operations together using a robust C⁴I, then.... The synergy attained provides strategic-level effects allowing no sanctuary for conventional and unconventional tactical and ballistic missile threat operations, thereby en-

hancing force survivability and lethality while minimizing casualties.

The commanding general of the U.S. Army Training and Doctrine Command is responsible for the execution of the theater missile defense advanced warfighting experiment with the commanding general, Fort Bliss, as the executor of the experiment (see the Command and Control chart below). The commanding general of Fort Sill is the Army integrator of all theater missile defense doctrine, training, leader development, organizations, materiel and soldier solutions. As displayed in the methodology illustration at the bottom of the next page, the

COMMAND AND CONTROL



theater missile defense advanced warfighting experiment special action team will conduct a series of analyses that include a model-test-model approach to produce an Army theater missile defense operational concept and handbook. These two products will help the Army leadership focus on battlefield techniques, tactics and procedures, high-payoff technologies and equipment that will assist in fielding an integrated theater missile defense force in the future. The *ADA* magazine will publish the results once they are approved by the Chief of Staff of the Army.

Conclusion

As outlined above, the air threat to U.S. forces has changed dramatically in recent years. The manned fixed-wing threat has decreased

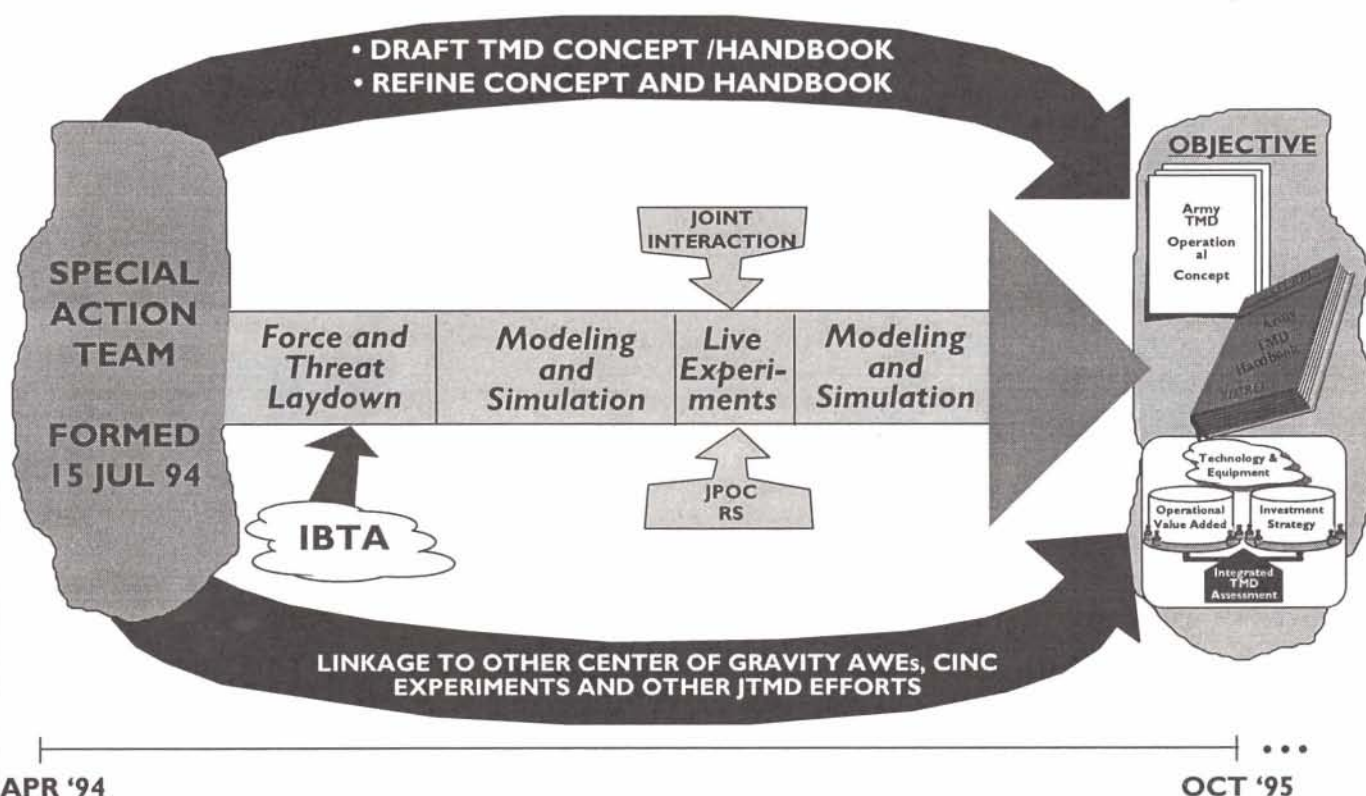
while the unmanned threat from theater ballistic missiles, cruise missiles, air-to-surface missiles and unmanned aerial vehicles has increased. The Army has responded to this change by reducing its efforts to develop capabilities to counter the manned fixed-wing threat while optimizing current and future systems to counter the missile and unmanned aerial threats.

These ongoing efforts acknowledge that missile and unmanned aerial vehicle threats are real and growing rapidly and that force protection from missile attack will be vital in all phases of future contingency operations. The Army is aggressively pursuing an accelerated systems and doctrinal development process — within the framework of the theater missile defense pillars — in response to presidential, congress-

sional and Joint Chiefs of Staff guidance. These initiatives recognize the contributions of the other services in achieving overall synergy in countering the theater missile threat. The foundation for this effort has been laid by the solid combat and materiel developer relationship within Air Defense Artillery and the Army as well as the ties developed with the other services and agencies.

Lt. Col. Frank J. Caravella is the former head of the Air Defense Battle Lab, Fort Bliss, Texas.

METHODOLOGY



FORCE PROJECTION TOC

A COMMAND AND CONTROL SOLUTION

by Lt. Gen. Jay M. Garner

In theater missile defense (TMD) operations we often refer to *synergy* — the essential value added by integrating the operations of TMD — capable systems, organizations and procedures. We understand the need to coordinate attack operations, active defense and passive defense and the need to analyze and disseminate intelligence with speed and precision. In joint TMD we know this operational synergy

is indispensable: the services have necessarily specialized capabilities, but theater missiles don't recognize component boundaries. Synergy, however, is a slippery concept. In Roving Sands '95, the Army's TMD community gave substance to the concept. The Force Projection Tactical Operations Center (TOC) clearly demonstrated its capability to build operation synergy. In addition, the force projection TOC symbolized the organizational synergy of the Army TMD community.

Doctrine writers, resource managers, materiel developers and operators in centers such as Huntsville, Ala.; Colorado Springs, Colo.; Washington and our U.S. Army Training and Doctrine Command have been applying their energies to the TMD command and control problem. What has emerged — the prototype Force Projection TOC —

Col. E. Paul Semmens, ATMDE commander, directs a Roving Sands engagement in the Force Projection TOC.





greatly improves our worldwide ability to protect forces and ensure political support for force projection. The force projection TOC — as well as the soldiers in the Army TMD Element (ATMDE)—represent a commitment to solving the command and control problem. The commitment is grounded in a tradition of missile defense, guided by a body of technical and operational expertise and experience and built with Army resources.

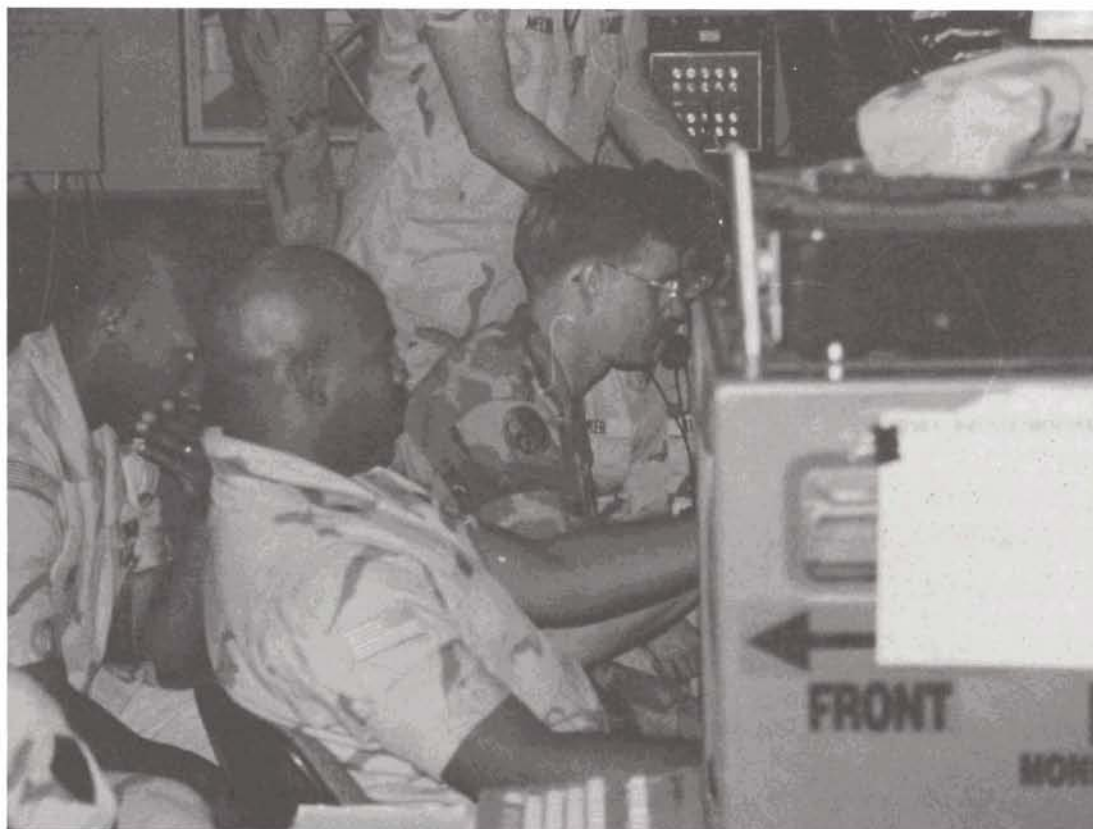
As soldiers, sailors, airmen and marines converged on Fort Bliss for Roving Sands '95, so too did the Army's TMD efforts. Roving Sands gave all services an opportunity to exercise joint TMD systems and procedures. The multinational operational environment included the most extensive TMD architectures since Desert Storm. With

more than 140 aircraft flying and tactical units and command posts deployed in the world's largest free-play air defense exercises, the ATMDE baptism took place under stressful conditions. This joint, free-play air defense environment gave the Army an opportunity to demonstrate that it is the pre-eminent provider of missile defense capabilities.

Questions have, of course, surfaced with the barrage of assessment rippling from Roving Sands. Frequently asked is "Which service or which TMD command and control system won the competition?" The interservice tug-of-war over air and missile defense roles and missions has been going almost non-stop for many years. It's not likely to end soon. The debate reflects perspectives intrinsic to the services and their needs

The TMD battle rages across computer screens as operators combine their skills to locate enemy launchers.

to operate on land, sea or in the air. More productive, it seems, is to focus on improvements: to praise the substantive improvements and target the shortfalls for future action. No, the Army can't seal the world in an airtight defensive cocoon, but we have much improved command and control capabilities, and we understand their limits. What's encouraging is that the technology is maturing and that the Army continues to take the lead in putting it into the field. Funding, which means risk assessment, will always be an issue on Capitol Hill. The Army team, however, is clearly doing its part to bring systems to their thresholds, develop the operational and organiza-



Once ADA units have been cued and units in the impact zone warned, the search for the launcher begins. The Force Projection TOC can find a launcher in a matter of minutes.

tional synergy required to fight a coordinated theater battle and get that message to those with influence over the national purse.

Many of this year's TMD activities aimed squarely at the major shortfall in joint TMD capabilities, directing the multi-element TMD battle in an expeditious, effective manner. Every event has a place and time; a capability that arrives too late is no capability. The Force Projection TOC, along with the expertise and operators we have developed during the last year's major TMD effort, now gives the land component commander a command and control capability that maximizes the individual systems we have worked so hard to develop.

In addition, the Force Projection TOC provides the systems interfaces — in

terms of electrons and soldiers — that yield operational synergy. The systems developed and integrated by Col. Dan Montgomery, program manager, Air Defense Command and Control Systems, and his product manager, Lt. Col. Jamie Moran, brings TMD to the foreground of the theater stage. Let's look at some examples from Roving Sands.

Theater missile defense battles span the theater of war in a matter of minutes. In the TMD fight, the land component commander must make decisions fast. He must react to or task national or theater sensors, defense support program platforms and theater unmanned aerial vehicles (UAVs) in a matter of minutes or lose the opportunity.

Properly informed and swiftly made land component commander decisions destroy enemy weapons of mass destruction and save friendly lives. The land component commander must decide in minutes or seconds. His orders must be precise and clear. The tough part is that his orders must be coordi-

nated throughout the theater. This process is the core of the Force Projection TOC's mission. This mission requires shining a highly focused spotlight on TMD to penetrate the war's fog and overcome its friction. The TMD battle staff must be trained and focused to anticipate procedural obstacles and lay the groundwork for rapid, decisive TMD operations.

One of the Force Projection TOC's exercise objectives was to practice conducting early entry engagement operations. This objec-

tive was met in part during the early days of the exercise when an Army tactical missile system (ATACMS) battery was placed under the tactical control of the ATMDE commander, a reasonable task organization while the corps is deploying into the theater. The Third Army commanding general, serving as the land component commander during most of Roving Sands, authorized Col. E. Paul Semmens, the ATMDE commander, to direct ATACMS engagements against confirmed high-value TMD targets. Using the Automated Deep Operations Command and Control System/Army Field Artillery Tactical Data System, the ATMDE directed an ATACMS to engage theater missile targets. The resulting precision attack destroyed Scud transporter/erector launchers — an extremely elusive target — in a forward operating base. This was the first time that an ATACMS battery had fired on an order originating outside the artillery chain of command.

Another success involved directing attack helicopters against TMD targets. During the latter phase of Roving Sands, the Force Projection TOC tasked a Predator UAV to search a named area of interest based on a simulated missile target indication. Piped directly into the force projection TOC, the Predator video confirmed the presence of the Army National Guard's Scud mock-ups. In the meantime, attack operations planning with III Corps' aviation brigade was underway. The combination of TMD-focused intelligence preparation of the battlefield, swift analysis of TMD intelligence and pre-coordination of TMD missions produced a successful attack.

Apache attack helicopters flew to the vicinity of the confirmed targets, acquired the targets on their gun cameras and conducted simulated engagements. Important to note here is that this occurred in a live-fire training mode and relied on cross-element operational synergy. If the Force Projection TOC had not been focused on the named area of interest developed during the detailed intelligence preparation of the battlefield, and if the Predator had not been available to rapidly confirm the presence of the targets, the opportunity would have passed without engagement.

Another operation supported the need for a joint missile defense coordinator to spotlight integrated multi-element and multiservice operations. The Force Projection TOC rapidly received and disseminated notice of Scud launches processed through the Joint Tactical Air Ground Station (JTAGS). The passive defense cell immediately passed the JTAGS-predicted impact point message to threatened units throughout the theater. Simultaneously, selected Patriot fire units began engaging the incoming Scuds, while the Force Projection TOC's "gun line," consisting of its intelligence and attack operations crew, coordinated ATACMS and Marine Corps attacks against targets in the launch area. This joint operation demonstrated streamlined reaction times and the value of a TMD coordina-

tor and a support staff to lay the groundwork for rapid, theater-level response.

Other TMD advances are also occurring. We now better appreciate ways a battle staff can contribute to the efficiency and survivability of active defense forces; we better understand the analytical capability required to maximize defense against a multithreat cruise, air-to-surface and tactical ballistic missile attack; and we have practiced innovative methods, such as using cellular phones and beepers, to apply commercial information-age technology for modern military purposes. Organizationally, the Army has a trained TMD battle staff that will become increasingly cohesive through this fall's exercises. The Force Projection TOC participated in the Joint Warfighting Interoperability Demonstration at Hanscomb Air Force Base, Mass., in September and was scheduled to deploy to support a European Command exercise in November. The TMD Advanced Warfighting Experiment (AWE) has coalesced into the base document for the Army field manual for TMD operations. Although prepared and coordinated by the U.S. Army Air Defense Artillery School, Fort Bliss, Texas, it represents the contribution of the entire community — operators, materiel developers and their staffs.

In the months ahead, we will exploit the successes of the TMD community and the capabilities demonstrated in Roving Sands. The Army TMD community's hard work will fuel the funding fight, enabling us to enhance and field our systems. The year's efforts have, as well, provided a foundation for the Army's Synthetic Theater of War-TMD, established this year in the Battle Integration Center at Huntsville, Ala. So, in addition to the synergies demonstrated in concrete ways at Roving Sands, other synergies and energy will emerge from the Army's TMD work this year.

Missile defense is growing increasingly important. An adversary can defeat our armed forces only by avoiding

pitched combat. Only by employing theater missiles to undermine the resolve of our allies, disrupt theater lodgments, inflict unacceptable mass casualties or disrupt our freedom to maneuver can an enemy force avoid defeat. The Army TMD community has greatly reduced enemy options and the Force Projection TOC is perhaps the best symbol of its work because the TOC and its battle staff provide the land force commander a capability that goes a long way toward ensuring that he can fulfill his force protection responsibilities.

Perhaps the most telling indicator of the Army's TMD success is a comment that Lt. Gen. Steve Arnold made during the "hot wash" held the day after Roving Sands. The Third Army commander directed his initial comment to assembled officers of the Army Space Command contingent. He advised them that he, henceforth, considered the Force Projection TOC a Third Army asset and that Army Space Command soldiers — many recently drawn from units and schools throughout the Army — should keep their bags packed and ready to deploy.



Lt. Gen. Jay M. Garner, a former chief of Air Defense Artillery, is the commander of the U.S. Army Space and Strategic Defense Command.

THEATER MISSILE DEFENSE

THE ARMY HAS A PLAN

by Brig. Gen. Joseph M. Cosumano Jr.
and Lt. Col. Patrick D. Mace

One of the most troubling threats confronting U.S. forces in any future conflict is the use of theater missiles, including tactical ballistic, cruise and air-to-surface missiles. Most experts agree that the relatively low cost of these weapons, combined with the observed proliferation of the technology required to produce them, makes them the weapons of choice for many Third World and developing nations.

The very real potential for their use as weapons of mass destruction by arming them with chemical, biological or nuclear warheads makes it even more compelling for our nation to have a robust plan to protect our forces and geopolitical assets from their use. The Army has a coherent plan and investment strategy that addresses the entire spectrum of the theater missile threat. Desert Storm showed that defeating this threat requires a four-pillared approach:

- Attack operations to destroy theater missiles and associated infrastructure before they can be used.
- Active defense to destroy any theater missiles that are launched.
- Passive defense throughout the theater to minimize risks to U.S. forces if a theater missile gets through the active defense system.
- An integrated command, control, communications, computers and intelligence (C⁴I) network to tie all of these elements into a cohesive system.

Collectively, these pillars comprise the TMD mission area. The complexity and range of potential TMD threats

makes it highly unlikely that a single service or individual weapon system could be solely effective in defeating these threats. Furthermore, the nature of the TMD threat requires a joint effort by all of the services to find, eliminate or defeat those threats. The Army is uniquely qualified to participate in this vital joint effort because it is the only service that currently possesses capability in all of the TMD pillars.

Until recently, the Army had various programs to deal with specific aspects of the theater missile threat. Apache attack helicopters and Army tactical missile system-equipped Field Artillery units could perform attack operations. Patriot and Hawk weapon systems served as the principal active defense systems; the U.S. Army Chemical School was developing tools such as the automated nuclear, biological and chemical information system to provide automated warning and plotting of potential NBC threats; and there were a number of Army and joint command and control and intelligence systems that could focus on theater missiles. Unfortunately, those programs were stovepiped within their separate battlefield operating systems, thus an integrated process to defeat the missile threat was not possible.

In recognition of these challenges, the Army's TMD plan incorporates programs to improve its capability in each of the pillars while developing operational concepts and detailed tactics, techniques and procedures to effectively use these capabilities in an integrated, joint TMD fight.

A TMD advanced warfighting experiment (TMD-AWE) was recently completed as part of Exercise Roving Sands that took place April 28 through May 8 at Fort Bliss, Texas, and White Sands Missile Range, N.M. Roving Sands provided the Army an excellent opportunity to experiment with its TMD concept and several innovative organizations and technologies and to demonstrate its ability to provide an integrated TMD system. A new element within the corps tactical operations center, the deep operations coordination cell, fused intelligence and targeting information received from the corps analysis and control element to rapidly plan, coordinate and synchronize attack operations against TMD threats. Promising results were observed in the use of special operations forces and unmanned aerial vehicles, such as the Predator, to locate TMD targets and pass near-real-time target location information to the deep operations coordination cell for engagement by Apache and Army tactical missile systems.

Live Hawk and Patriot units had the opportunity to hone their TMD skills, while sophisticated computer models using the extended air defense simulation enabled the Army to experiment with future concepts. A particularly exciting concept used extended air defense simulation to effect the first-ever linkage of a live Aegis destroyer to live Patriot units. One experiment determined the feasibility of using the forward area air defense ground-based sensor to detect low-flying, small radar cross section cruise missiles and to pass alerting information to a nearby Patriot unit. While the live experiment

was unable to replicate the small radar cross section of actual cruise missiles, the transfer of data was successful. In the area of passive defense, a unique warning system using commercial pagers, or "beepers," was tested to simplify and shorten the process used to warn selected forces of impending theater missile impacts. The beepers performed exceptionally well, providing warning to selected units within one or two minutes after receipt of the initial theater alert.

The crowning success story of the TMD-AWE was the operational debut of the ATMDE and its associated force projection TOC belonging to the U.S. Army Space and Strategic Defense Command. The ATMDE integrated national and tactical intelligence assets into the Army's command and control environment to defeat theater missiles. It served as a fusion center for an array of theater intelligence assets and enabled them to provide pas-

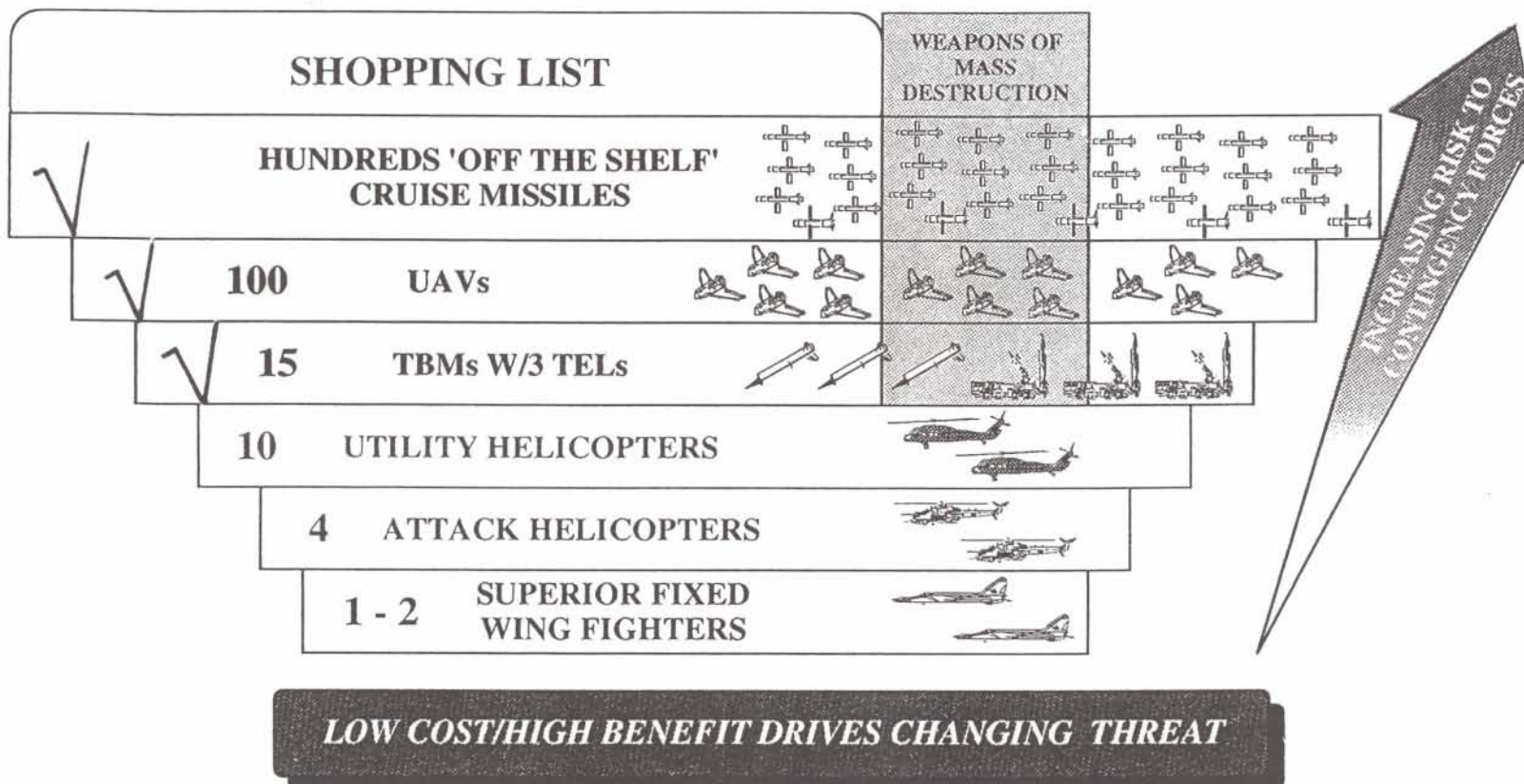
sive defense warning to the force, alert active defense units, and pass accurate targeting information through the deep operations coordination cell to Apache and Army tactical missile system units. While the focus of the ATMDE's capabilities during this experiment was integration of TMD within the Army, there are very clear indications that it could accomplish the same degree of TMD integration horizontally across the joint force.

The TMD-AWE allowed the Army to put its TMD plan to the test. A realistic synthetic theater of war environment provided the framework within which live exercise, constructive simulations and virtual simulations were used to validate Army TMD concepts and procedures. Many interesting insights were gained, but sober analysis shows that much remains to be done. Moderate success was achieved in experimentation with the "beeper" system, but passive defense continues to be a weak link

within the Army. While the introduction of automated tactical operations centers and other decision aids greatly improved the integration of C⁴I, there is still a need for further refinement of our ability to properly use the plethora of information provided by national, theater and tactical sensors. Despite these challenges, there is no doubt about the success of the TMD-AWE and its validation of the Army's overall TMD plan. Armed with these insights, the Army is anxious to continue its TMD integration efforts with the other services to ensure that the joint force commander has a holistic, coherent and integrated system to defeat any future TMD threat on the battlefield.

Brig. Gen. Joseph M. Cosumano Jr. is the Director of Plans, J-5, U.S. Space Command. Lt. Col. Patrick Mace, the former chief of the Concepts and Studies Division, Directorate of Combat Developments, Fort Bliss, Texas, served as the deputy director of TRADOC's TMD-AWE Studies and Analysis Phase.

If given **\$50M** 'Any' Adversary Could Buy . . .



AUTOMATION SUPPORT FOR THE TMD BATTLE

by Maj. Paul McGuire

The move to the 21st century force is no more evident than when observing the ongoing efforts in automation support for the TMD fight. Automation has occurred at most levels of the force and commanders have at their fingertips vast amounts of information, provided in useful formats and with the needed speed to influence the battle. During the April 15 to May 9 live exercise phase of the TMD-AWE, the Army's automation support for the TMD fight was evident. Automation support for TMD forces was present from the highest to lowest echelon; i.e., from the ATMDE (supporting TMD operations at the Army component commander level) to the ADA soldier (receiving a live air picture on his simplified hand-held terminal unit).

TMD operations are enhanced by the ability of units to share information in a timely and efficient manner. The addition of automation in support of TMD information flow ensures that sensor information is quickly processed and put in the hands of the shooter; that passive warning information can flow quickly from the satellite, through the ground processing station, to the soldier or unit; and that situational awareness is present for all the commanders. One example of automation support during the TMD-AWE was the deep operations coordination cell, which served as the center for focusing and integrating the planning, coordination, synchronization and execution functions for deep operations. The deep operations coordination cell provided automated tools to work the decide, detect, deliver and assess targeting meth-

odology for the commander and his staff.

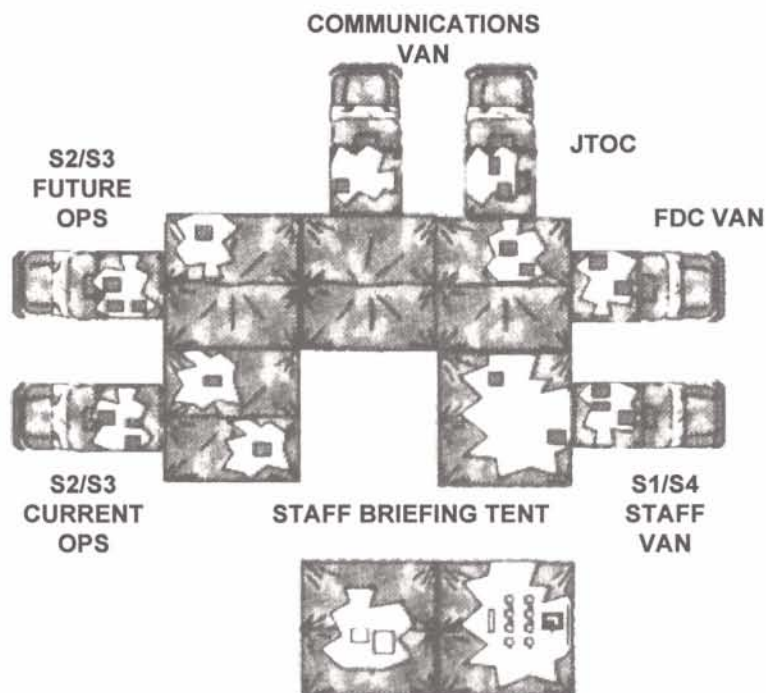
The air defense brigade TOC (below) is one of the ADA community's first steps toward building a common TOC for all levels of operation (brigade to battery). The ADA brigade TOC is comprised of a set of hardware, software and shelters that allow the commander and staff to execute critical force and engagement operations functions. This includes conducting intelligence preparation of the battlefield, performing mission and defense planning, maintaining an air and ground picture, monitoring and managing the air battle, disseminating air and tactical ballistic missile early warning, and performing routine staff functions.

The ATMDE is the senior Army commander's TOC to plan, deconflict and coordinate at the Army component level with functionality spanning the active defense, passive defense, attack operations and battle management (BM)/C²I area of TMD. The ATMDE

consists of four modular cells that have broad-based communication capabilities to enable it to interface with lateral, other Army, joint and national elements. It is especially suited for the command and control of TMD forces during early entry operations and, in a sustained theater, oversees Army TMD operations.

These efforts with other automation tools being brought to the battlefield will ensure that the Army's technological edge will remain a key component on any future battlefield. As Togo D. West Jr. said, "Like our partners in the private sector, we are faced with the choice of changing shape or shaping change — and we are smartly choosing the latter. Today in this great Army we are setting our sights on the future — and the future for tomorrow's Army begins with Force XXI."

Maj. Paul McGuire is the chief of the Concepts Team for the TMD-AWE.





Special operations forces deployed behind enemy lines to provide near-real-time targeting information against enemy launchers.

FINDING THE NEEDLE IN THE HAYSTACK

by Lt. Col. Patrick D. Mace

During Operation Desert Storm, the United States learned that finding and attacking tactical ballistic missiles and their transporter erector launchers (TELs) was a lot like finding a needle in a haystack. There were a total of 88 Scuds fired during Desert Storm; the coalition air forces launched at least 4,859 sorties to find and destroy the TELs that fired them. Unfortunately, despite the high technology assets devoted to the "Great Scud Hunt," the air forces didn't find a single TEL. As part of the Army's ongoing effort to devise a coherent, integrated, four-pillar approach to defeat theater missiles, the Army recently demonstrated that special operations forces and

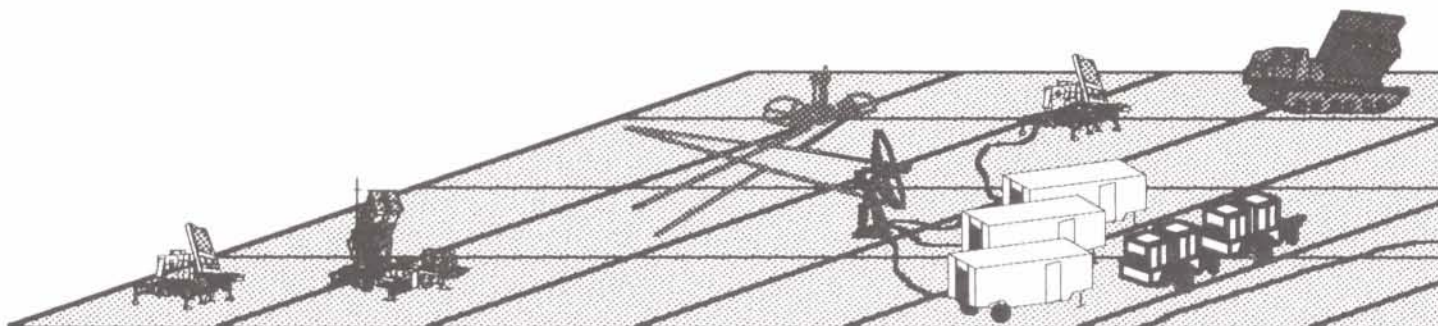
unmanned aerial vehicles can make a significant contribution to solving this puzzle. Testing the effectiveness of using special operations forces and unmanned aerial vehicles to locate tactical ballistic missiles and TELs was a focal point of the Roving Sands TMD-AWE.

The experiment was conducted in a realistic synthetic theater of war environment that combined live participants with constructive and virtual computer simulations. The live "battlefield" was huge tracts of White Sands Missile Range that comprised much of southern New Mexico. The tactical ballistic missile threat consisted of four Scud brigades and one SS-21 brigade. Two of the

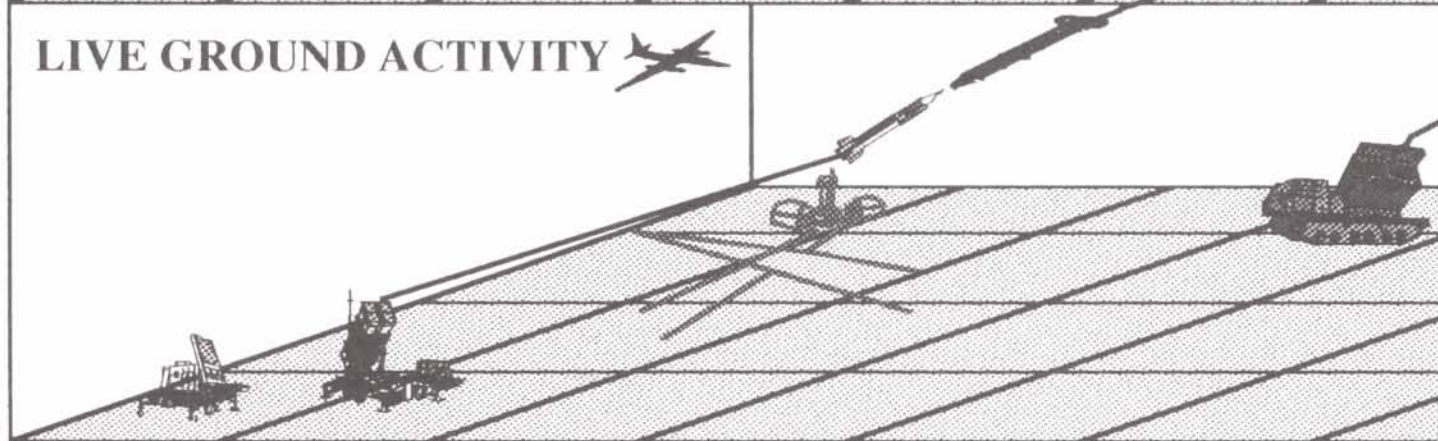
Scud brigades were entirely simulated, while the other two brigades were a combination of simulated and live equipment. Soldiers from the Kansas Army National Guard served as opposing forces soldiers for the two live brigades. The live Scud equipment included 15 TELs, 19 decoys and 18 command and control and logistical vehicles. For increased realism, the two live Scud brigades were protected by four live SA-6 surface-to-air missile batteries and eight ZSU-23/4 surface-to-air guns. ADA soldiers from Fort Bliss manned the live SS-21 brigade and operated two live TELs, three decoys and five command and control and logistical vehicles.

An operational detachment A-team (ODA) from the U.S. Army 5th Special Forces Group was deployed "behind enemy lines" with the mission to locate enemy TELs. Although the live TELs were dispersed all over southern New Mexico, the ODA successfully pinpointed approximately 23 TELs and numerous command and control and logistical vehicles. Using specialized communications, the ODA provided near-real-time targeting information to guide both Army and Air Force attack systems to the TELs.

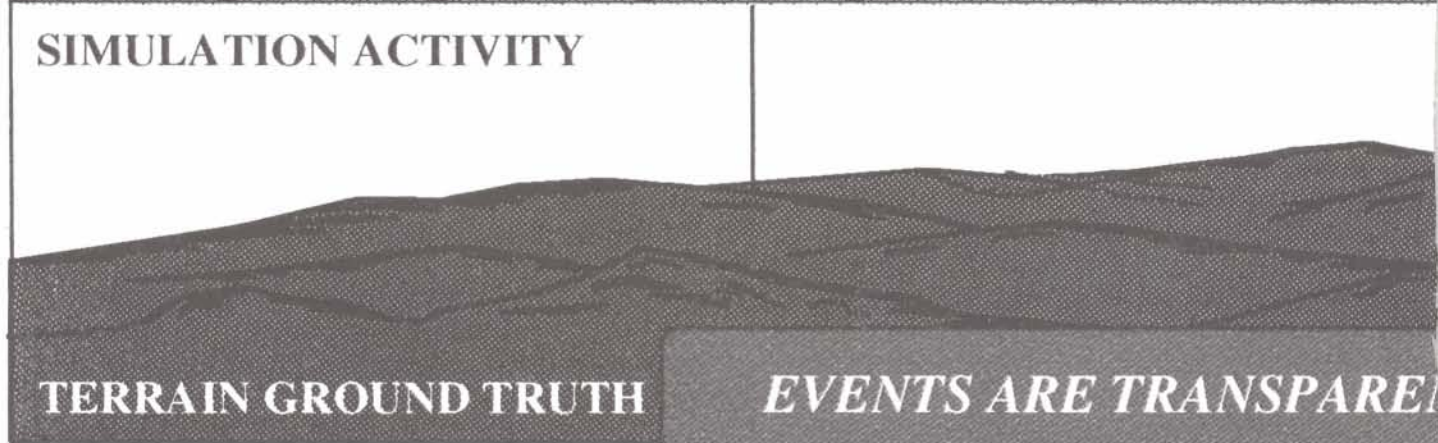
LIVE AIR ACTIVITY



LIVE GROUND ACTIVITY

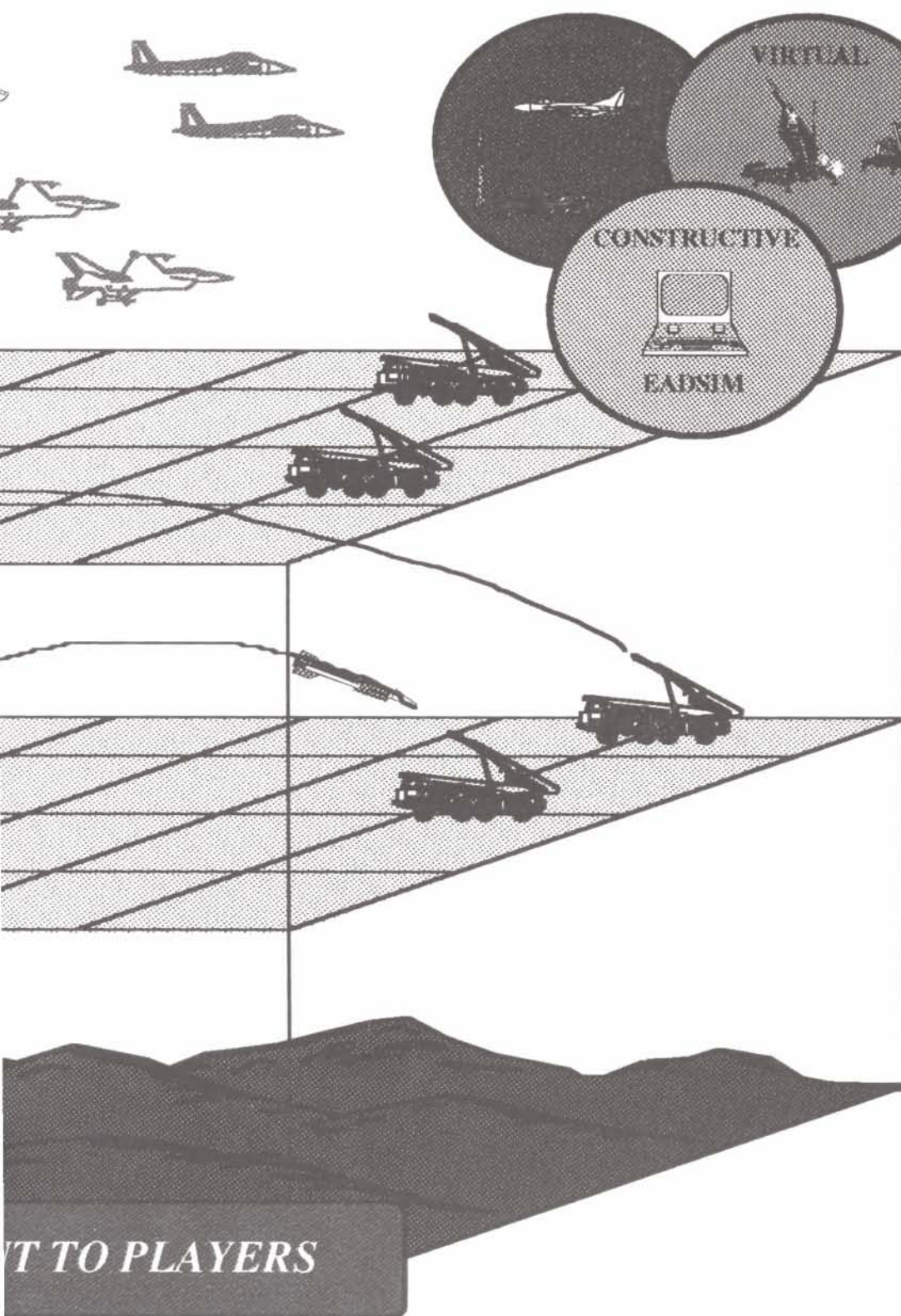


SIMULATION ACTIVITY



TERRAIN GROUND TRUTH

EVENTS ARE TRANSPARENT



The Predator, a medium-altitude endurance prototype unmanned aerial vehicle under the operational control of Third Army during the experiment, was assigned systematic reconnaissance and surveillance flight profiles over enemy territory. On several occasions the Predator located live TELs and provided real-time targeting information that was successfully used by Army and Air Force attack platforms. The successes of special operations forces and the Predator by no means solve the entire problem of how to find and target theater missiles, but they certainly provide a piece to the much larger puzzle. There is no doubt that sophisticated satellite and airborne sensors also play an important role in finding these targets. The services must continue to work together to find better ways to integrate our efforts, and exploit the vast sensor capabilities that we possess. The search for an optimal solution to this complex problem will continue, but in the meantime, the TMD-AWE proved that special operations forces and unmanned aerial vehicles can provide the joint force commander at least one way to find the needle in the haystack.

Lt. Col. Patrick Mace, the former chief of the Concepts and Studies Division, Directorate of Combat Developments, Fort Bliss, Texas, served as the deputy director of TRADOC's TMD-AWE Studies and Analysis Phase.

The synthetic theater of war environment combines live participants with constructive and virtual computer simulations.

PATRIOT AND AEGIS: JOINT THEATER MISSILE DEFENSE

by Maj. Paul McGuire

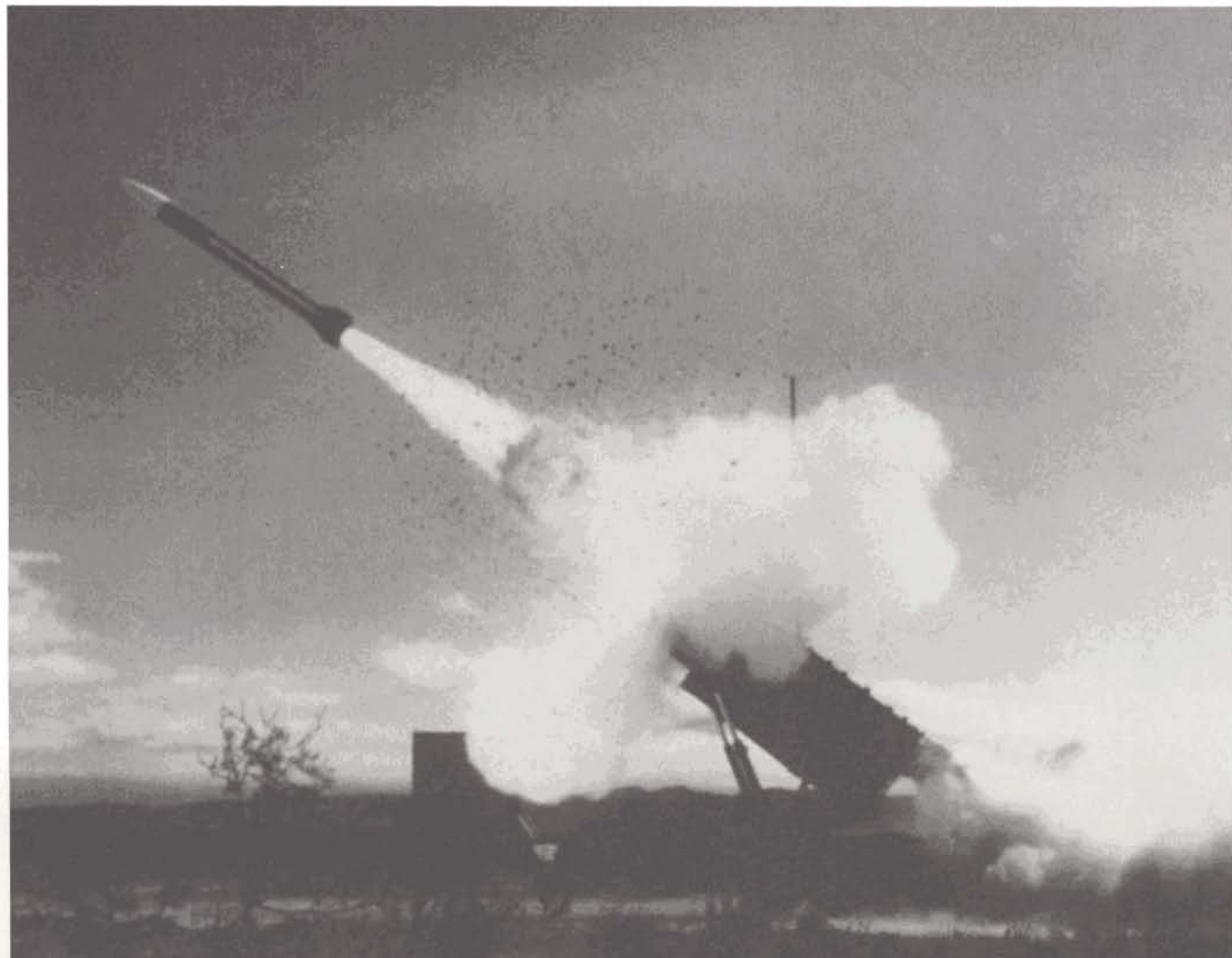
The call for arms has sounded again for the United States, and with it comes the deployment of forces to a faraway land to face another foe. In such contingency deployments, operational success depends upon our ability to deploy forces quickly, safely and efficiently into the theater of operations. This requires the ability to protect soldiers, sailors, airmen and their associated equipment as they move into the the-

ater. One of the greatest threats facing deploying forces comes from enemy theater missile systems. These systems include theater ballistic missiles, cruise missiles and tactical air-to-surface missiles. Currently, the Patriot missile system meets the need for an active defense capability (ability to engage and destroy the missiles and their associated air delivery systems in flight).

In joint operations, other Army and service systems will complement Patriot's active defense coverage. One

of the systems that will help Patriot protect the force is the Aegis missile system. Aegis and Patriot coverage of the force will require coordination and integration. For example, Patriot could deploy to a port city's airport to provide protection of the air port of debarkation and Aegis could be stationed, close off

Sharing situational awareness, defense design, system location and operation status information will help Patriot and Aegis integrate and synchronize their coverage.



the coast, to protect the port facility or sea port of debarkation.

To integrate and synchronize coverages, Patriot and Aegis must share situational awareness, defense design, system location and operational status information. The services plan to accomplish this information integration by operating the systems together in exercises or experiments. One such recent opportunity to integrate the systems in an operational setting occurred during the TMD-AWE live exercise. This experiment, conducted during the recent Roving Sands/Optic Cobra '95 exercise held at Fort Bliss, Texas, linked Patriot systems and an Aegis destroyer. The Patriot systems were part of the Army's

forces deployed around the city of El Paso to protect airfield and oil production facilities, while Aegis (actually located off the coast of California) was positioned in the simulated Sea of Mexico (the country of Mexico). The systems shared operational information to facilitate active defense effectiveness in the theater of operation. In the future, this flow of information will become more important as other Army and Navy systems are developed and deployed. When the Army's upper-tier system (THAAD) becomes operational, or when the Navy's upper-tier system is available, the integration of active defense forces will require closer coordination.

The ability of upper- and lower-tier systems to operate as a cohesive defense requires not only the type of information discussed earlier, but will also require more near-real-time information sharing during the engagement process.

The joint nature of the TMD battle requires continued development of capabilities and procedures to effectively integrate all active defense systems. The Army's and Navy's efforts will ensure that future deployment of forces will have protection from an enemy's missile capabilities.

Maj. Paul McGuire is the chief of the Concepts Team for the TMD-AWE.



INTEROPERABILITY WITH ALLIES

by Capt. Robert Johnson

History was made during Roving Sands '95, the largest joint air defense exercise in the world, as the Group Guided Missile De Peel (GGW-DP) from the Royal Netherlands Air Force was operationally controlled by the 11th ADA Brigade at Fort Bliss, Texas. The GGW-DP consists of one Patriot battery with five launchers, two Hawk assault fire platoons, seven Stinger missile teams and various supporting elements totaling approximately 450 soldiers. This was the first time that coalition forces have participated in a Roving Sands exercise.

The 11th ADA Brigade's goal was to conduct contingency operations in a joint/coalition setting and to function as an integral part of an integrated air defense system designed to counter hostile theater ballistic missiles and air-breathing threats. To support that goal the brigade's primary mission was to provide theater ballistic missile defense for designated theater assets based on the commander in chief's priorities. Through integration with the 11th ADA Brigade air defense tactical operations center (ADTOC), the GGW-DP contributed significantly to the TMD plan by implementing three of the four elements (often referred to as the "four pillars") of TMD: active defense, passive defense and C⁴I.

Active defense operations against tactical ballistic missiles require a joint team effort to defeat this especially difficult threat. The GGW-DP contributed by engaging numerous short-, medium- and intermediate-range ballistic missiles, cruise missiles and their launch platforms. Their success was due in large part to their flexibility and tactical proficiency. During Phase II, the GGW-DP operated as a separate battalion under the 11th ADA

Brigade while during Phase IV they were task organized with 3-43 ADA and integrated a U.S. Patriot firing battery into their battalion. This task organization allowed the brigade and our Dutch allies to jointly integrate our tactics, techniques and procedures, resulting in a holistic and cohesive TMD force.

Passive defense measures in the form of emissions control was an important measure the GGW-DP used to reduce the vulnerability of the force. Because of the early warning provided by the control and reporting center and the 11th Brigade ADTOC, the GGW-DP was able to remain emission control-silent until they were required to radiate to defend a threatened asset. In the past, a theater ballistic missile alert required all firing batteries to radiate. The brigade ADTOC is capable of receiving and disseminating predicted theater ballistic missile launch and impact points and impact times. This information allows the brigade and battalions to successfully manage their emission control by selectively choosing individual batteries to radiate, and then radiating only long enough to conduct the engagement.

C⁴I was another key component in integrating the GGW-DP into the brigade.

The GGW-DP voice and data circuits were established with the brigade ADTOC via the multiple subscriber equipment network for the first time ever. The brigade had a 100-percent connectivity rate with the GGW-DP during the entire exercise. The reliable connectivity was critical to the successful management of the air battle and the dissemination of current intelligence. It also effectively supported the NBC warning reporting system during numerous chemical attacks delivered by Hind helicopters. Considering the automation differences between the GGW-DP and the 11th ADA Brigade, C⁴I was extremely effective.

Roving Sands '95 was an outstanding training opportunity for the 11th ADA Brigade and the GGW-DP. The brigade ADTOC proved highly effective in TMD operations. It provided the command and control necessary to fight and manage an aggressive air battle. It also provided voice and data early warning and coalition forces, other services and subordinate battalions. The 11th ADA Brigade and the GGW-DP were a cohesive coalition force, proving in a demanding exercise environment that multinational interoperability is more than just feasible, it's practical. Both nations can look forward to effective integration for future exercises or contingency operations with confidence.

Capt. Robert Johnson was formerly with the S-3 Section, 11th ADA Brigade, Fort Bliss, Texas.



WHY THE ARMY NEEDS CORPS SAM: INSIGHTS FROM ROVING SANDS

by Maj. Glenn Guyant

Roving Sands '95 provided the Army with an excellent opportunity to experiment with its TMD concept and several innovative organizations and technologies. The exercise also reinforced the Army's need to field the Corps SAM weapon system to fill a void that exists as a result of emerging threats.

THE EMERGING THREAT

Tactical ballistic missiles, unmanned aerial vehicles and cruise missiles have emerged as the threats of greatest concern due to their inherent capabilities, variations and available quantities. Consequently, today's threat is much more diversified and stressing. While manned fixed-wing aircraft still remain a threat, they are not the greatest concern to U.S. ground forces. Sophisticated helicopters are still proliferating and are a concern to the maneuver forces, particularly in the close battle area. Unmanned aerial vehicles allow an adversary to conduct reconnaissance, intelligence, surveillance and target acquisition operations to detect friendly forces, then disrupt the commander's plan with directed fires. In the future, based on readily available technology, cruise missiles will provide a cost-effective means to accurately deliver an assortment of warheads. The tactical ballistic missile threat was demonstrated

during Operation Desert Storm. Tactical ballistic missiles have wide applicability due to diversity in range and payload. There is high payoff for potential adversaries who use available and relatively cheap, state-of-the-art technologies.

INSIGHTS FROM THE TMD-AWE LIVE EXERCISE

During the TMD-AWE live exercise, Red forces successfully employed elements of this emerging threat against Blue forces. The tactical ballistic missile threat consisted of four Scud brigades and one SS-21 brigade. Two of the Scud brigades were entirely simulated, while the other two were a combination of simulated and live equipment. Short-range missiles, particularly SS-21s, presented unique problems for III Corps TMD operations.

Alpha Battery, 1st Battalion, 914 SSM Bde (SS 21 SCARAB), was particularly successful in engaging a wide range of targets within the III Corps area without retaliation. Due to the short "burn time" and minimal trajectory of the SS-21, simulated sensors were not able to detect the SS-21 launches. While a modified Firefinder radar was employed to simulate detection of the SS-21 launches, the mountainous terrain of the battery's employment area (North Oscura Peak) and superb training of the crews in camouflage and site evacuation after firing prevented accurate targeting for

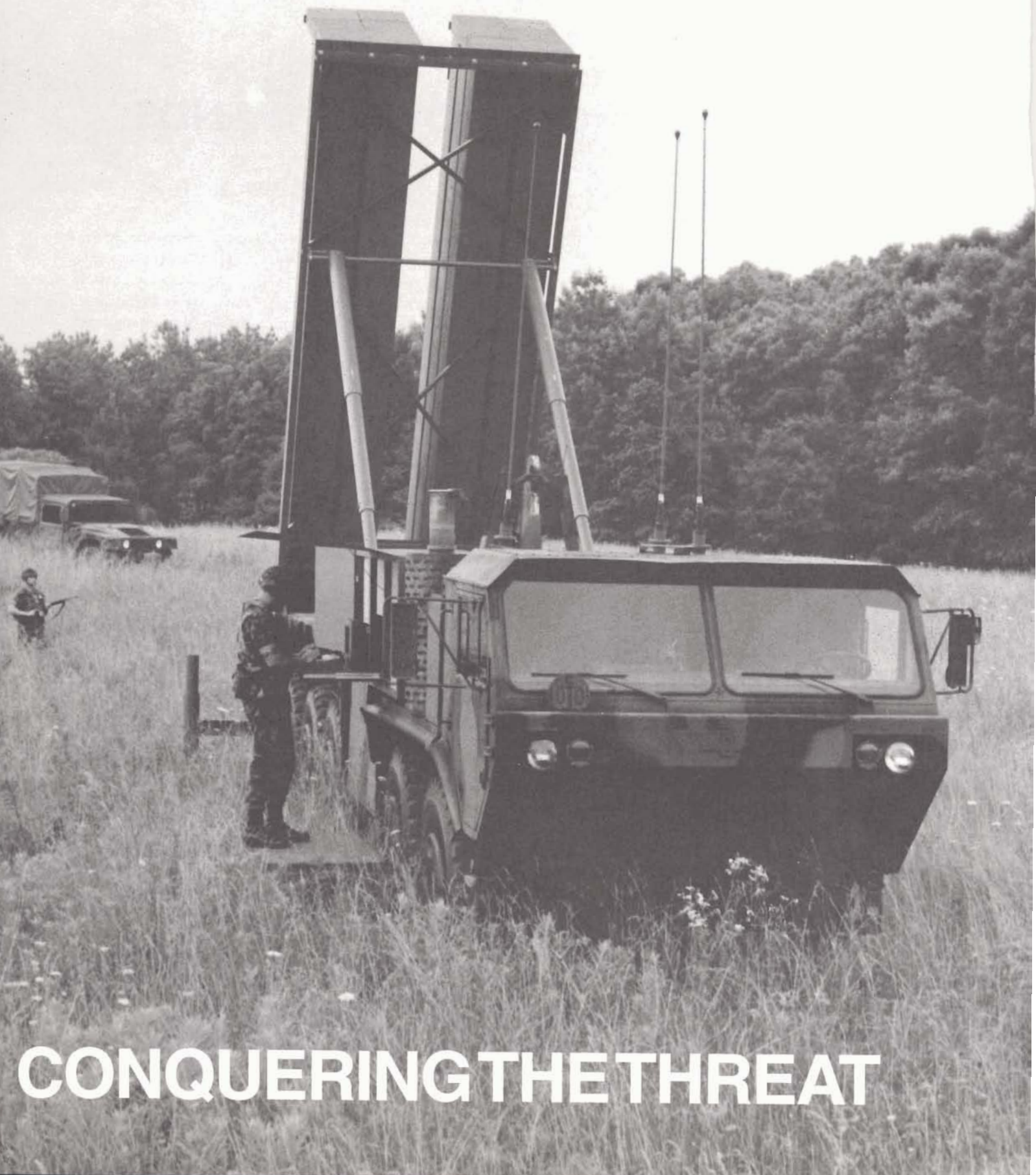
counterfire. Even with special operations forces and a Pioneer unmanned aerial vehicle dedicated to locating the SS-21 battery, the 914th successfully fired all missiles, many with chemical warheads, against some 20 corps and division targets. The battery was not detected during a single mission, and they were not engaged by Army tactical missile systems or fixed- or rotary-wing aircraft.

Cruise missile surrogates flown during the Roving Sands exercise also attacked corps targets at will. Although an advanced technology sensor was deployed to detect the surrogates, Army corps still lack an engagement capability against cruise missiles. The bottom line was that the corps did not receive much support from theater assets for what was considered a "corps threat" (those short-range missiles impacting in the corps area).

This inability to deal with major elements of the emerging threat during Roving Sands highlights a deficiency in corps missile defense capabilities. The Army must field the Corps SAM system to ensure protection of friendly forces and allow the corps commander to accomplish his mission.

Maj. Glenn Guyant has served as the administrative officer for TMD-AWE for the past year.

A SILVER BULLET —



CONQUERING THE THREAT

by Maj. Ralph F. Merrill
and Maj. Chuck Nickey

A letter home from the theater, circa 2002: I'm sitting in my fighting position more than two thousand miles away, wondering when the next missile attack alarm is going to sound. We hear the alarm frequently, but haven't seen the first sign of an incoming missile. This new THAAD weapon system must be as good as they say. Last time I went through this I was a young private, just out of AIT, sitting in Saudi Arabia and wondering if some Scud was going to ruin my day. There were lots of alerts then, too. Patriot took care of us, but we had chunks of Scud fall right next to our unit's area.

This new THAAD weapon system is really something. Seconds after leaving the launcher, the missile disappears into the sky; we have no idea what the results are, and no one I've talked to has seen any Scud junk in the two months we've been here. Biggest problem is remembering to react to the alert in case something does get through . . .

INTRODUCTION

The Theater High-Altitude Area Defense (THAAD) system is rapidly nearing reality under the management of Program Manager Col. Fred Kilgore. By the time you read this, the first intercept of an incoming theater ballistic missile by a THAAD interceptor should be history.

The THAAD system is the first endo/exoatmospheric system in the world being developed specifically to defend against the theater ballistic missile threat. The Army is preparing to operate a deployable THAAD prototype by 1997, and is working out any "bugs" in preparation for production of the objective system. It's here . . . it's now . . . but what is it?

WHY THAAD?

Theater ballistic missiles provide their owner a weapon of potentially great destructive power, with relatively

low cost in terms of manpower, maintenance and training. As such, theater ballistic missiles are becoming the weapons of choice for many countries seeking to boost their military and/or political presence at the regional and international level. Today more than 20 countries own and operate ballistic missiles, and many of these either possess or are seeking to develop nuclear weapons.

This situation, coupled with the unpredictability of potential adversaries, presents a serious threat to troops, population centers and critical assets worldwide. Theater ballistic missile employment options include use for geopolitical leverage or a weapon of terror, as well as operational and tactical uses. Launch ranges can vary from 30 to more than 3,000 kilometers, with many systems capable of altering trajectories to match specific mission requirements. Conventional, nuclear, biological and/or chemical warheads have been fielded around the globe, with the technology often for sale to anyone willing to pay the bill. Warhead technology efforts can also be expected in the areas of separating or multiple re-entry vehicles, submunitions, terminal guidance and anti-radiation missiles. The use of self-protection features may be deliberate or inadvertent and can include breakup, maneuver, decoys or electronic countermeasures (ECM). Many theater ballistic missile systems are highly mobile, reusable and extremely hard to locate and destroy prior to launch.

Current U.S. defense against incoming theater ballistic missiles is limited to the Patriot Advanced Capabilities-2 (PAC-2) system. While Patriot proved invaluable during the Gulf War, its effectiveness against theater ballistic missiles is limited. PAC-2 does not provide sufficient defense against the full spectrum of threats and can only defend a relatively small area on the ground. While most would agree that this capability served the United States well in the Gulf, it is hardly an optimal solution. Even with the fielding of the PAC-3 capability in 1998, Patriot will be

limited to endoatmospheric intercepts. By definition, Patriot intercepts occur within the atmosphere, allowing theater ballistic missiles to penetrate above the defended area, subjecting it to potential damage from debris or secondary effects of the intercept.

THAAD is designed to operate above Patriot's capabilities, providing both long-range exoatmospheric and short-range endoatmospheric intercept capabilities. A single THAAD fire unit will be able to defend a large geopolitical area against the short- and medium-range theater ballistic missile threat spectrum. When complemented by lower-tier defensive systems (such as Patriot or Corps Surface-to-Air Missile) in asset defense roles, Air Defense Artillery will provide a near-leakproof capability against theater ballistic missiles.

THAAD PROGRAM DESCRIPTION

THAAD system development began in 1987 with concept studies performed by the High Endoatmospheric Defense Interceptor Project Office at the U.S. Army Strategic Defense Command

BALLISTIC MISSILES IN DEVELOPING COUNTRIES

Afghanistan
Argentina
Brazil
China
Egypt
India
Iran
Iraq
Israel
Libya
North Korea
Pakistan
Saudi Arabia
South Africa
South Korea
Syria
Taiwan
Vietnam
Yemen

(USASDC). These studies investigated the application of key strategic defense technologies (infrared seeker, fast-response control system and advanced cooled seeker window designs) to the theater missile defense problem. A separate program was established within USASDC to develop a high-altitude theater missile defense concept and pursue an acquisition strategy to demonstrate its capabilities.

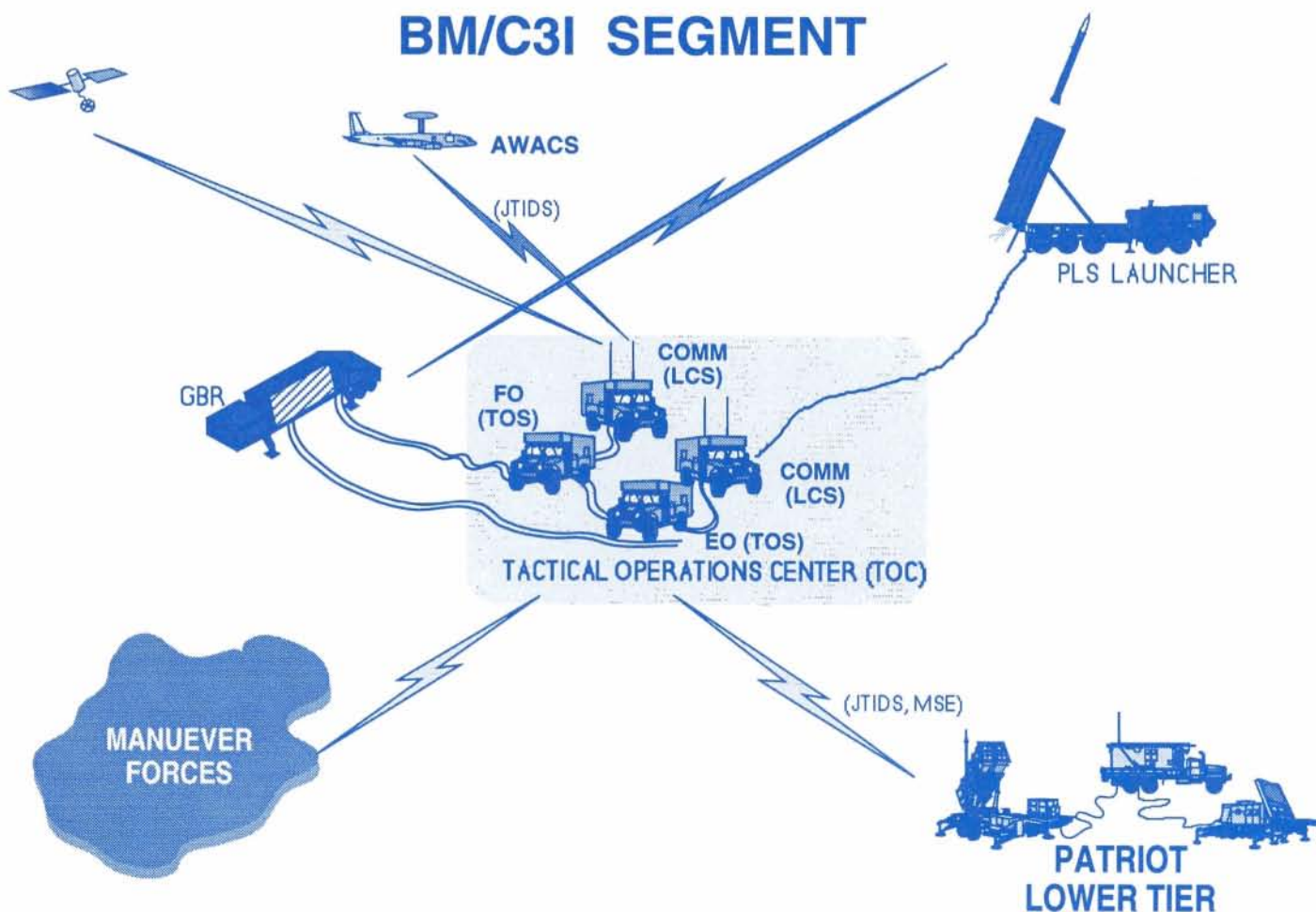
In the Missile Defense Act of 1991 Congress directed the aggressive pursuit, development and deployment of an advanced theater missile defense (TMD) system by the mid-1990s. The Army recognized that it would be nearly impossible to integrate the di-

verse, emerging technologies required to field a fully capable system in five to six years, and so developed a strategy that provides a near-term emergency deployment capability, using the prototype hardware, while building toward the objective system.

Contracts for development of the THAAD system were awarded to Lockheed Missiles and Space Company (missile, launcher and battle management/command, control, communications, and intelligence [BM/C³I] segments) and Raytheon Corporation (radar segment). The initial phase of system development has been termed the demonstration and validation, or DEM/VAL, phase. The DEM/VAL phase is intended to develop the initial hard-

ware components of the THAAD system, prove the ability to integrate the segments into a system, and conduct initial intercepts of theater ballistic missiles. The DEM/VAL phase will prove the readiness of varying technologies to accomplish the TMD mission.

The THAAD acquisition strategy meets Congress' edict for an early TMD deployment capability via the User Operational Evaluation System (UOES) configuration. UOES components provide an emergency deployment capability consisting of two THAAD UOES batteries. These batteries will be used to provide early soldier training and to conduct early operational testing of the THAAD system. Lessons learned dur-



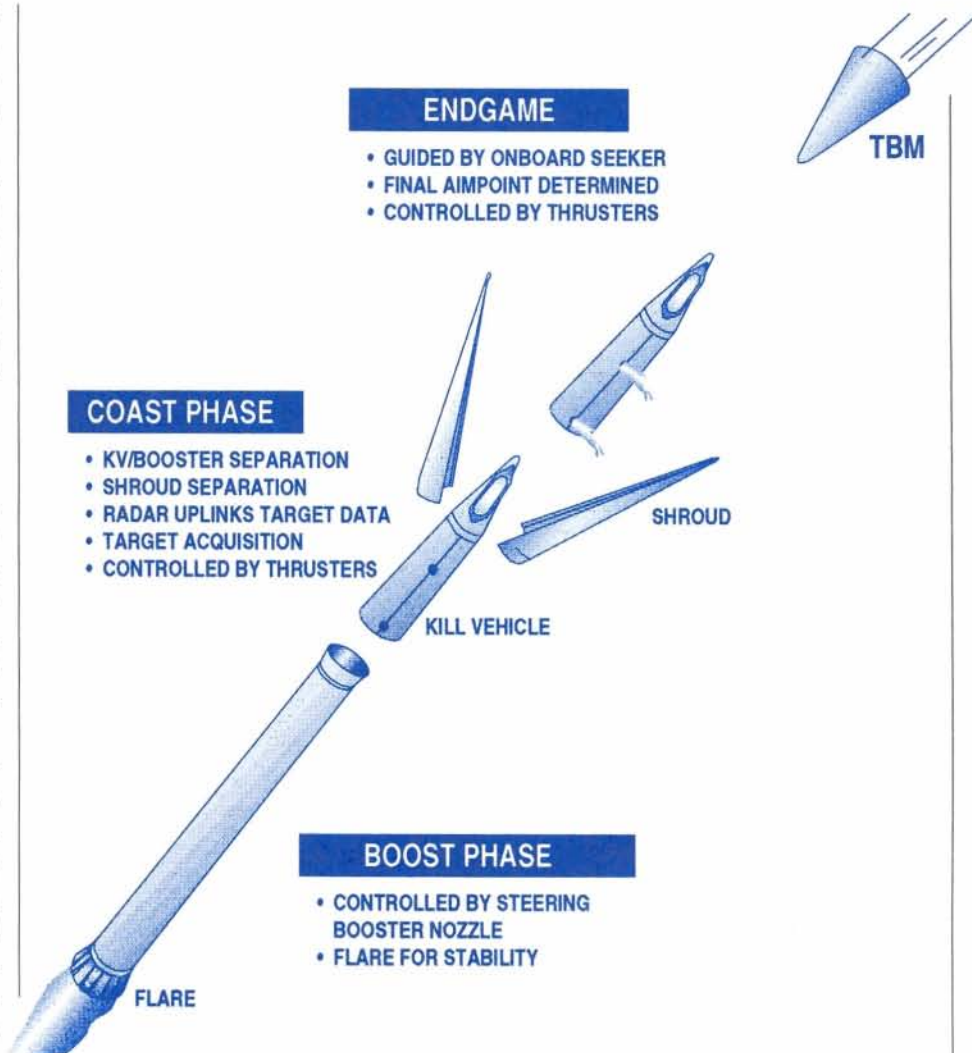
ing operations and testing with the UOES equipment will be used to improve tactics, techniques and procedures, as well as to improve the design of the objective THAAD system.

Contracts for the engineering and manufacturing development (EMD) phase of THAAD system development will be awarded in early FY97. The objective THAAD system will be designed and fabricated during the EMD phase with initial fielding of objective system equipment in FY02.

SYSTEM DESCRIPTION

The THAAD system may be described in terms of four components: BM/C³I, missile, launcher and radar. These components are described below in terms of their UOES configuration. The differences between the UOES and objective systems will be covered separately.

BM/C³I Segment. The BM/C³I segment controls all functions in the THAAD system. The BM/C³I system also provides an interface with the theater air defense command and control system and other Army and joint systems, and can collect data from external sensors. The BM/C³I system consists of a tactical operations station and a launcher control station. The name "launcher control station" was carried forward from some early conceptual work in which it routed commands from the tactical operations center to the launcher. The launcher control station now performs as the communications van or communications relay van. Together, these elements form a distributed, replicated, non-nodal command and control system that adheres to the Army's philosophy for future air defense systems. The THAAD BM/C³I system supports a wide variety of communication protocols to ensure interoperability with Army and joint forces. The principal communication link between the BM/C³I system elements is the Joint Tactical Information Distribution System (JTIDS). The BM/C³I system elements form networks on which sensors and BM/C³I system



elements report track data and other critical battlefield information to each other and other air defense systems. The networks are designed so that loss of any BM/C³I element does not result in the loss of access to other system elements. This architecture greatly enhances system survivability and availability and minimizes the logistical burden associated with the BM/C³I elements.

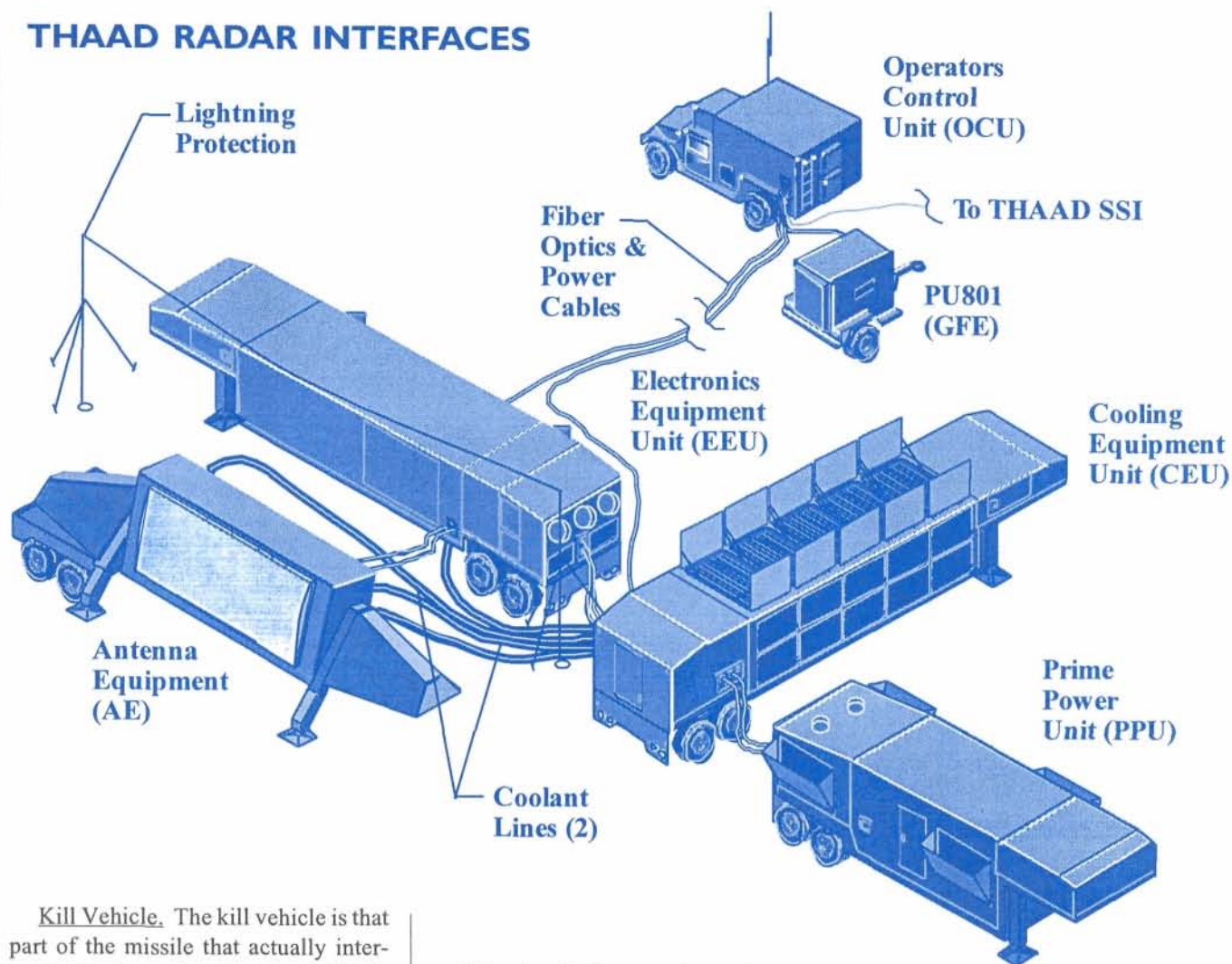
Missile Segment. The THAAD missile design builds on various technologies developed in past Ballistic Missile Defense Organization programs to achieve hit-to-kill accuracy while maintaining a configuration well suited to the THAAD operational requirements. It consists of a kill vehicle and a propul-

sion system housed in a lightweight graphite epoxy canister.

Propulsion System. A single-stage solid-propellant booster, a thrust vector control system and deployable aerodynamic flares comprise the propulsion system. The booster's function is to deliver the kill vehicle at the desired speed and to the required altitude to intercept the incoming threat. The thrust vector control system steers the missile during the boost phase of the flight. The booster's aerodynamic flares deploy shortly after launch to provide stability during flight.

An interstage connecting the booster and kill vehicle houses ordnance components that enable kill vehicle and booster separation.

THAAD RADAR INTERFACES



Kill Vehicle. The kill vehicle is that part of the missile that actually intercepts the incoming theater ballistic missile. It is a technically sophisticated device that can search for and lock onto a target, and then accurately intercept and destroy that target using only high-speed body-to-body impact. A two-piece shroud covers the forecone during endoatmospheric flight to reduce aerodynamic drag and to protect the seeker window from aerodynamic heating. The shroud is ejected prior to seeker acquisition. The kill vehicle divert and attitude control system provides attitude, roll and stabilization control, as well as end-game divert capability. The infrared seeker has an uncooled sapphire window. The seeker design includes an all-reflective Korsch optical system and platinum silicide staring focal plane array. A ring-laser gyro is mounted on the platform to measure and

stabilize the platform motion and serve as a reference for the seeker measurements. The divert and attitude control system includes separate aluminum oxidizer, propellant, pressurant tanks and divert thrusters. An integrated avionics package contains reduced instruction set computers to provide for hit-to-kill guidance.

Missile Canister. The missile is protected prior to launch by the missile canister, which is constructed of graphite epoxy materials to minimize weight. The canister is hermetically sealed, providing protection while the missile is being stored or transported and enabling THAAD to be treated as a certified round. The canisters also act as a launch tube and are fastened to a missile round pallet in an eight- or 10-round missile pack. The missile round pallet is then in-

stalled on the launcher, and the missiles are fired directly from the canister.

Launcher Segment. The THAAD launcher system is a self-propelled mobile launch platform with a design based on the U.S. Army palletized loading system truck. This launcher system provides commonality with the existing Army inventory and increases reload flexibility in the field. Crews can reload the launcher and be ready to fire in less than 30 minutes. The dormant missile can be launched within seconds of receiving its launch command. The palletized loading system also allows for personnel and equipment force structure savings. THAAD launchers are transportable on C-141 aircraft, can be

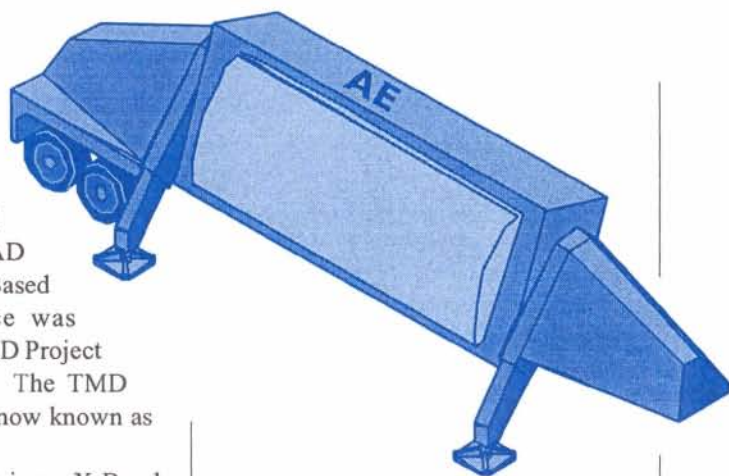
quickly deployed to regions where they are needed, and satisfy THAAD's requirement for rapid setup, launch and reload.

The launcher is composed of state-of-the-art subsystems. The battery/battery charger subsystem will support 12 days of unattended operation.

Radar Segment. The THAAD radar fulfills an urgent requirement for a capable wide-area, long-range defense radar to provide surveillance and fire control support to the THAAD missile system and to provide cueing to lower tier systems such as Patriot. The THAAD radar began its development under a separate Ground-Based Radar Project Office as part of a DEM/VAL program for a family of radars, to meet both national missile defense and TMD requirements. Raytheon was awarded the DEM/VAL contract to develop the ground-based radar family in September 1992. As a result of the bottom-up review and reduced emphasis on national missile defense, the primary focus of the Ground-Based Radar Project

Office became the TMD ground-based radar. Because the TMD ground-based radar is solely designed to be part of the THAAD system, the Ground-Based Radar Project Office was merged into the THAAD Project Office in June 1995. The TMD ground-based radar is now known as the THAAD radar.

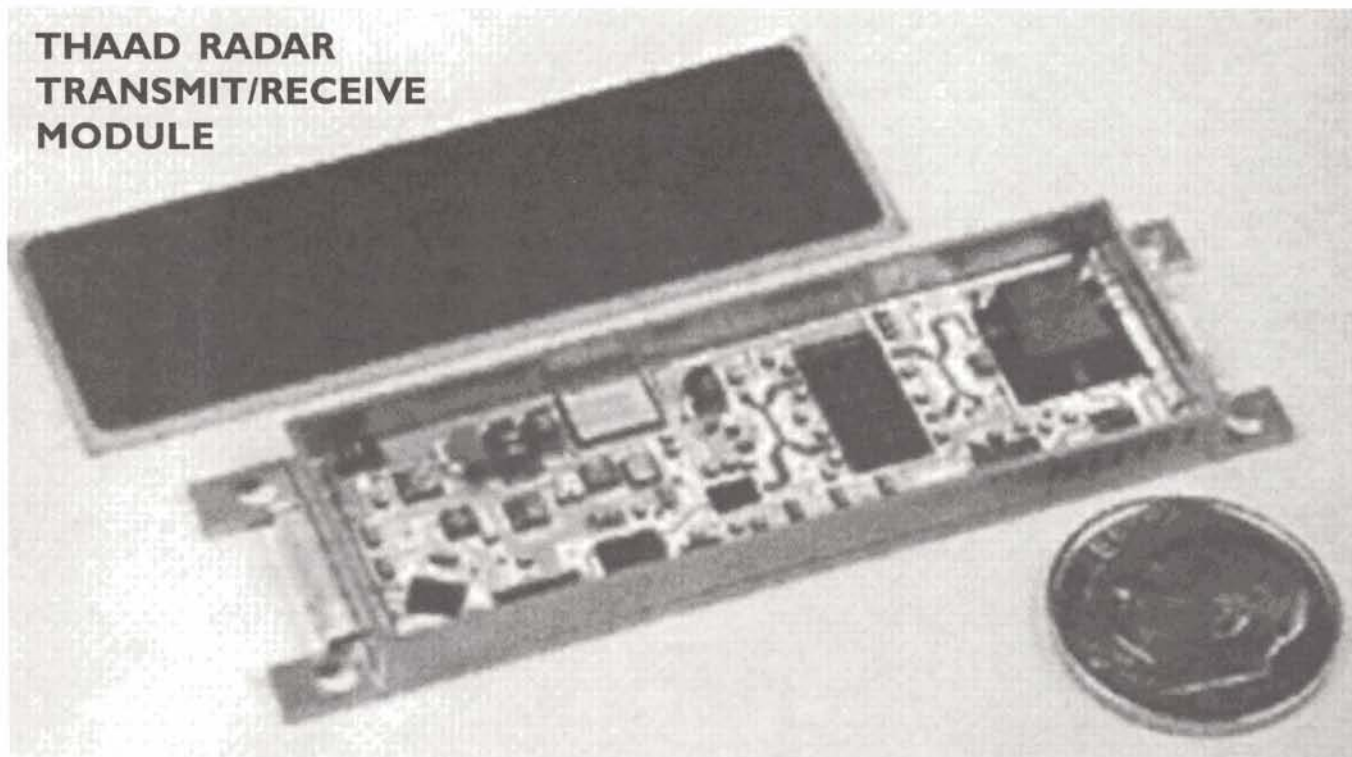
The THAAD radar is an X-Band, phased-array, solid-state radar, transportable on C-130 aircraft. It uses state-of-the-art radar technology to accomplish threat detection, threat typeclassification and theater ballistic missile launch/impact point estimation. It will determine which targets are theater ballistic missiles and which object in the target field is the re-entry vehicle, or warhead, to be killed, provide aim point updates to in-flight THAAD interceptors and perform kill assessment after intercept.



The THAAD radar consists of five components. The radar components are described below.

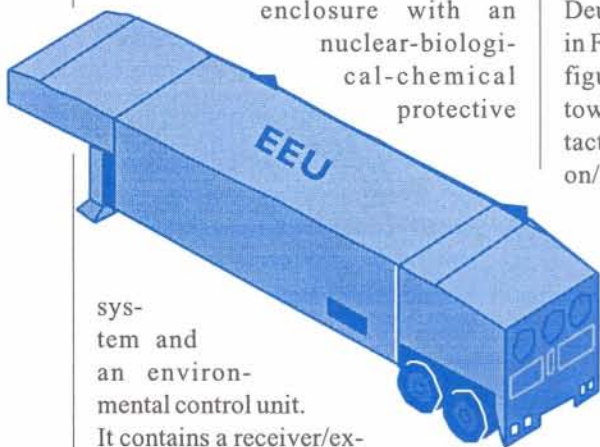
Antenna Element. The antenna element's basic components are the antenna assembly and the front and rear mobilizer assemblies. The antenna element includes all transmitter and beam steering components as well as power and cooling distribution systems. It consists of a tightly integrated structure that combines the array face/antenna structure with the antenna

THAAD RADAR TRANSMIT/RECEIVE MODULE



equipment shelter for an overall reduction in weight and cost. The UOES active aperture is populated with more than 25,000 radiating elements, each driven by a transmit/receive module. The mobilizer assemblies provide both road mobility and elevation adjustment of the array aperture.

Electronics Equipment Unit. The electronics equipment unit is a modular, structurally integrated trailer and enclosure with an nuclear-biological-chemical protective



system and an environmental control unit. It contains a receiver/exciter test target generator, signal processing equipment, high speed recorders and data processing equipment.

The signal processing equipment in the electronics equipment unit consists of four MP2 massively parallel processors. This is the first military application of massively parallel processing and provides a greater-than-100-percent margin on design requirements. The signal processor provides the required spectral analysis, pulse compression and subsequent detection, and preliminary image processing of digitized radar return samples from the receiver.

The data processing equipment consists of two commercial off-the-shelf VAX 7000/620 computers. The data processing equipment performs computations in support of live mission operations, pre- and post-mission data processing, maintenance and real-time simulations. A record of activities is recorded on high-speed recorders. The tapes provide an error log, recording of operator actions, operator system and

application software trace, and interceptor uplink data recording.

Prime Power Unit. The prime power unit consists of a diesel engine close-coupled to an alternator, a control panel, a transfer switch, all necessary miscellaneous items and a weather-proof enclosure mounted on a wheeled assembly. The engine is a 12-cylinder 396 TC34 manufactured by the Motoren-und-Turbinen-Union, a Deutsche Aerospace Company located in Friedrichshafen, Germany. It is configured on a semitrailer that can be towed by a heavy expanded mobility tactical truck with C-130 aircraft roll-on/roll-off capability. The unit is capable of providing 1.1 megawatts of power.

Cooling Equipment Unit. The cooling equipment unit is a 40-foot-long, 36,250-pound enclosed trailer that houses the liquid cooling equipment for the antenna equipment. It also houses the system power distribution unit, which provides main power to the antenna equipment and the electronics equipment unit. The cooling equipment unit supplies a solution of water/glycol liquid coolant to dissipate the heat generated by the antenna equipment array (or warm the array to initial operating temperature in low ambient temperature conditions; an oil-fired boiler is provided to meet coolant temperature requirements in all specified climatic conditions). The cooling equipment unit is C-130 compatible for roll-on/roll-off.

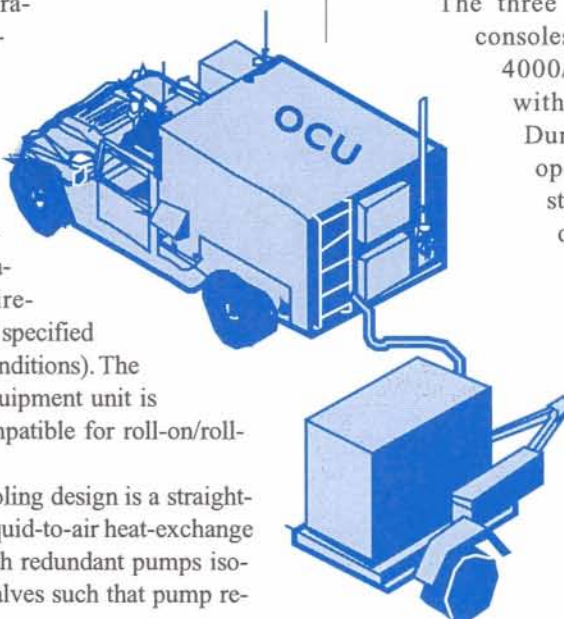
The cooling design is a straightforward liquid-to-air heat-exchange system with redundant pumps isolated by valves such that pump re-

moval is possible while the other pump supports radar mission operations. The cooling equipment unit pumps supply liquid coolant at a rate of 290 gallons per minute.

Key cooling equipment unit features include quick disconnect fittings on coolant lines to enhance rapid deployment capabilities and an automatic air separator. A status panel indicates coolant reservoir levels and signals an alarm to warn the operator of low coolant pressure, over heating and fan failure.

Operator Control Unit. The operator control unit is a separate component in the DEM/VAL phase of the system and it's functions may be merged into the other four radar components in the objective system. It houses the radar's operations consoles and communications equipment in a standard integrated command post shelter, mounted on a high-mobility, multipurpose, wheeled vehicle. The operator control unit is capable of C-130 roll-on/roll-off, and it tows an Army standard 15kw generator set providing 208V, three-phase AC power. This arrangement allows for the deployment of the operator control unit up to 500 meters from the antenna equipment via fiber-optic data link. It can also receive power from the radar's prime power unit.

The three operator control consoles consist of DEC 4000/90 workstations with color monitors. During live mission operation, the workstations are assigned operations monitoring, communications interface and maintenance monitoring/spare-backup. The three displays are used for radar calibration, data collection, mis-



sion practice, real-time and non-real-time mission simulations, operator training, fault isolation and live missions. Their configuration also supports operator and maintenance training.

OBJECTIVE SYSTEM

As previously stated, one purpose for the DEM/VAL phase of the THAAD program is evaluate components. These evaluations with early soldier interaction allow better definition of objective system requirements.

Some areas under consideration for the objective system are interceptor speed and interceptor seeker sensitivity; eliminating the operator control unit and incorporating its functions into other components; and using a larger aperture and higher-power transmit/receive modules to increase antenna power.

TEST PROGRAM

The DEM/VAL flight test program began in April 1995 at White Sands Missile Range, N. M. The flight test schedule consists of 14 missile flight tests over an 18-month period. The targets for the flight test program are developed by the TMD Targets Product Office of the U.S. Army Space and Strategic Defense Command. The THAAD system's kinematic capability stresses range debris management instrumentation resources.

Testing during engineering and manufacturing development (EMD) will begin with the limited user test after Milestone II in FY97 and continue through initial operational test and evaluation (IOT&E) in FY01. A UOES characterization test will be conducted

in the Pacific at Kwajalein Missile Range early in the EMD phase to characterize the system in a more operationally stressing scenario. The Kwajalein atoll allows use of longer-range, threat-representative targets than can be used at White Sands due to range and safety limitations. The flight tests will include up to five missiles against single and multiple threat-representative target scenarios. These tests will be designed to replicate the threat as closely as possible in terms of radio frequency and infrared signatures, flight profiles, and performance characteristics.

One of the most interesting and challenging aspects of the THAAD test program and acquisition process is that soldiers are involved so early. Soldiers from 1-6 ADA have completed the first set of training courses taught by the contractors and will soon begin monitor, assist and perform sequences leading to operator firings during DEM/VAL rather than later in the program's life cycle.

OPERATIONAL CONCEPT

The THAAD mission as part of a TMD (Patriot/THAAD) task force is to



The first successful flight test at White Sands Missile Range, N.M., April 21, 1995.

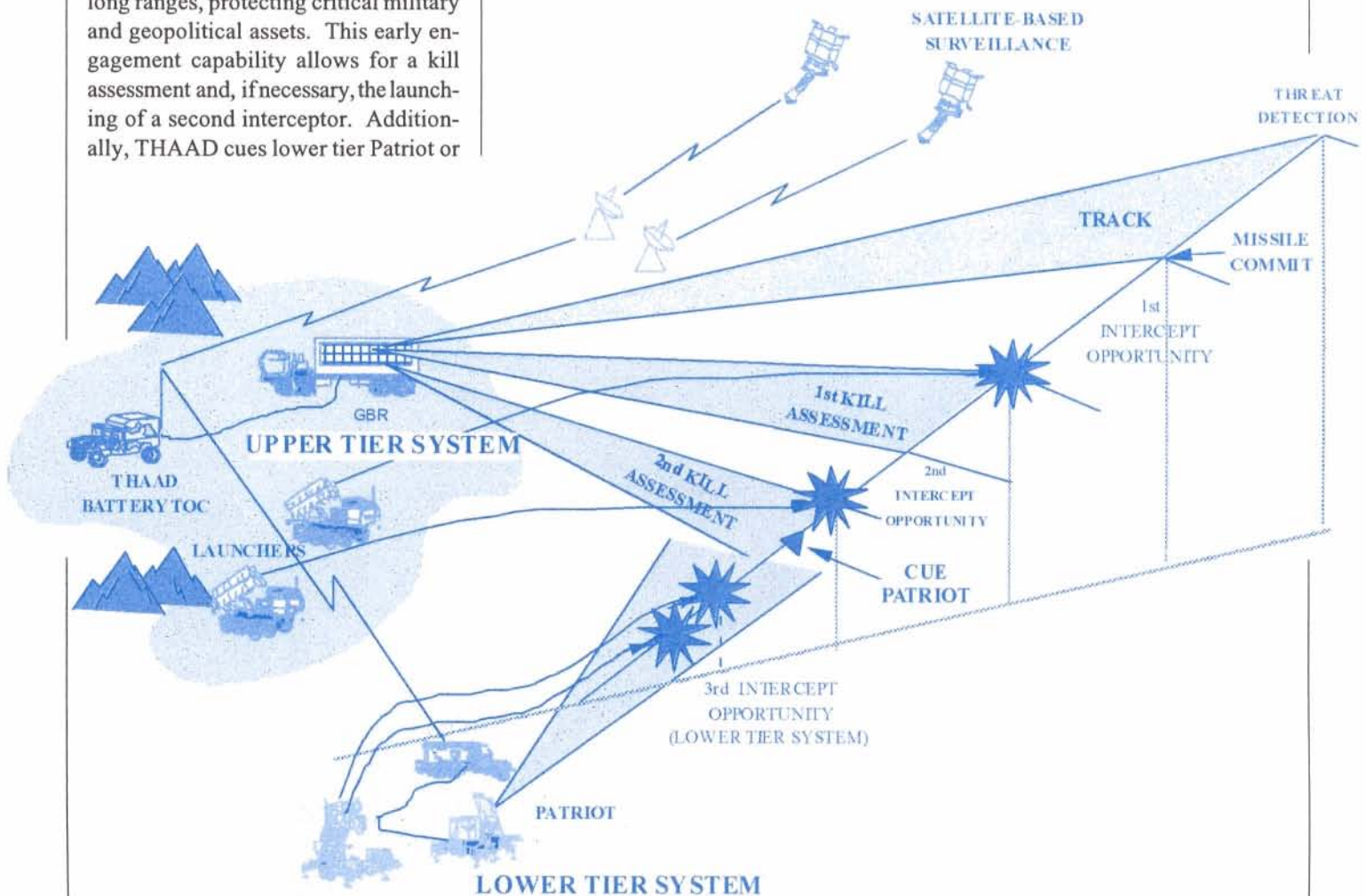
be the upper tier component in a near-leakproof defense against the theater ballistic missile threat. THAAD will provide endo and exoatmospheric, long-range intercept capability, engaging and neutralizing incoming theater ballistic missiles. Two significant features of the THAAD system are its "hit-to-kill" lethality and its "shoot-look-shoot" engagement capability. With "hit-to-kill" technology being used to destroy the target, there is no warhead on the THAAD interceptor. It relies entirely on its ability to find, identify and destroy a target using kinetic energy. THAAD possesses a "shoot-look-shoot" engagement capability by virtue of its extraordinary range. The long-range detection capability of the radar, coupled with the speed of the interceptor, allows engagements at extremely long ranges, protecting critical military and geopolitical assets. This early engagement capability allows for a kill assessment and, if necessary, the launching of a second interceptor. Additionally, THAAD cues lower tier Patriot or

Corps SAM units for them to potentially engage. This multiple-shot opportunity at most incoming theater ballistic missiles will ensure a virtually leak-proof defense.

In addition to a near-leakproof defense, the two tiers will deny the enemy a preferred attack option (theater ballistic missile attack) and support the theater and corps battles. The upper tier will engage theater ballistic missiles at higher altitudes and longer ranges while the lower tier will engage short-range theater ballistic missiles as well as the traditional air-breathing threat and other tactical missiles. THAAD has been designed to engage and destroy a threat set comprised of medium-range ballistic missiles and a subset of short-range ballistic missiles, excluding those with very

short ranges and/or very low-altitude trajectories. This layered defense approach, using upper and lower tier defenses, provides high confidence of threat intercept.

A THAAD battery will typically fight as part of a TMD task force commanded by the lower tier battalion, most probably Patriot. This task force will provide protection against theater ballistic missiles for key assets during the lodgment, deployment and expansion phases as land forces prepare for combat operations. The task force will continue to defend high-value assets at theater and corps to support and sustain combat operations throughout the duration of the campaign. In addition, key geopolitical assets may also be protected due to the stabilizing effect this could have



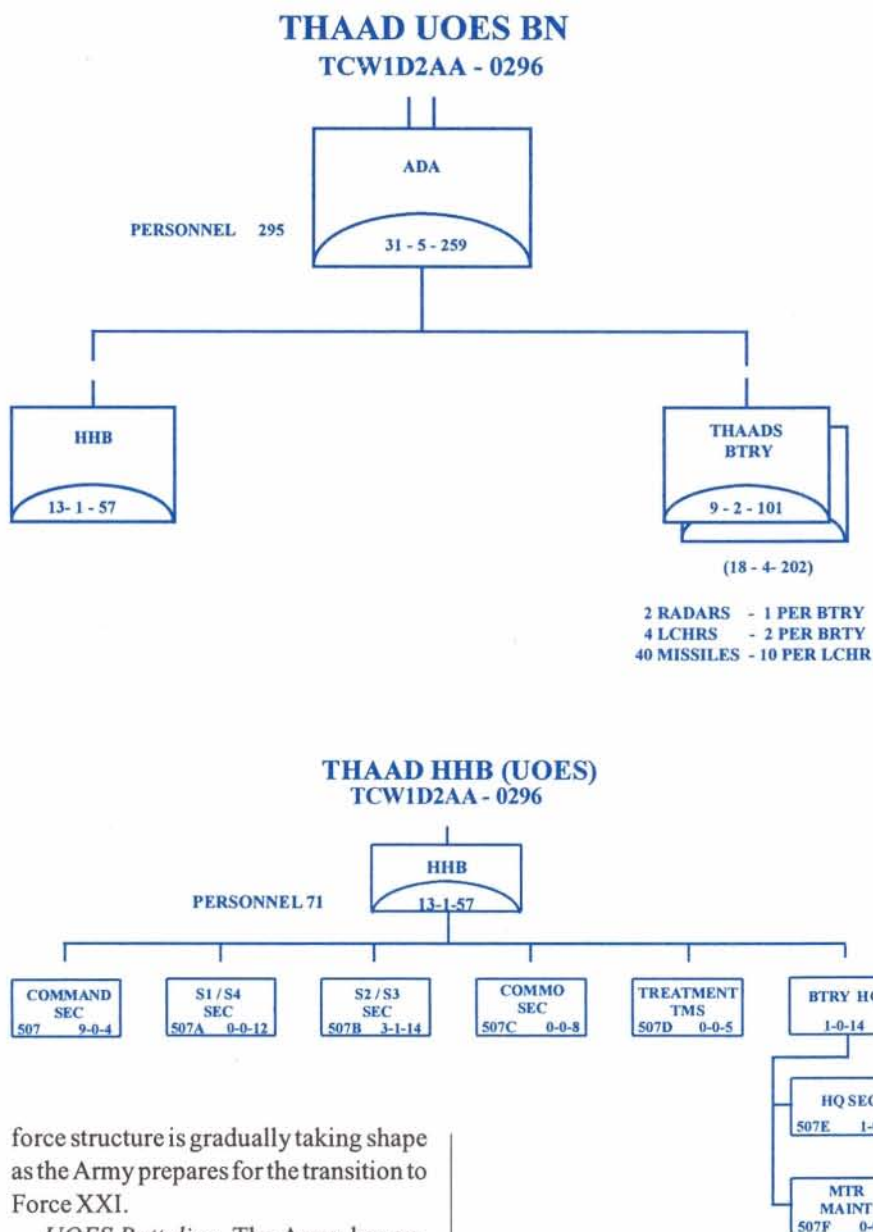
in a theater as well as providing a measure of deterrence by demonstrating national resolve through the employment of defensive weapons. Although THAAD can operate autonomously, it is interoperable with other air defense systems and external sensors.

Standard task force deployment will normally consist of one Patriot battalion (three to six batteries depending on the assets to be protected) and one THAAD battery. The THAAD battery is the basic warfighting unit in the THAAD organization. The task force composition may vary depending upon the theater situation, the availability of forces and strategic lift capability.

During tactical operations, authority to engage theater ballistic missiles will be decentralized to the firing battery level. The THAAD battery tactical operations center controls the upper tier TMD battle and coordinates with the TMD task force air defense tactical operations center on lower tier theater ballistic missile engagements. Coordination will involve exchange of information, including operational status, track data, engagement status and an assessment of engagements. The THAAD battery will make theater ballistic missile engagement decisions and determine method of fire (e.g., shoot-look-shoot) based on a number of factors, which include defended asset priority, number and type of threat missiles expected, interceptor missiles remaining and expected single-shot kill probability. This decision process will include consideration of the levels of protection Patriot will provide.

THAAD FORCE STRUCTURE

Since the fielding of THAAD will give ADA soldiers new career options and create new command and promotional opportunities, soldiers are naturally curious about THAAD force structure. How many soldiers will be assigned to a THAAD battalion? How many new military occupational skills, if any, will be created? Some questions remain to be answered, but the THAAD



force structure is gradually taking shape as the Army prepares for the transition to Force XXI.

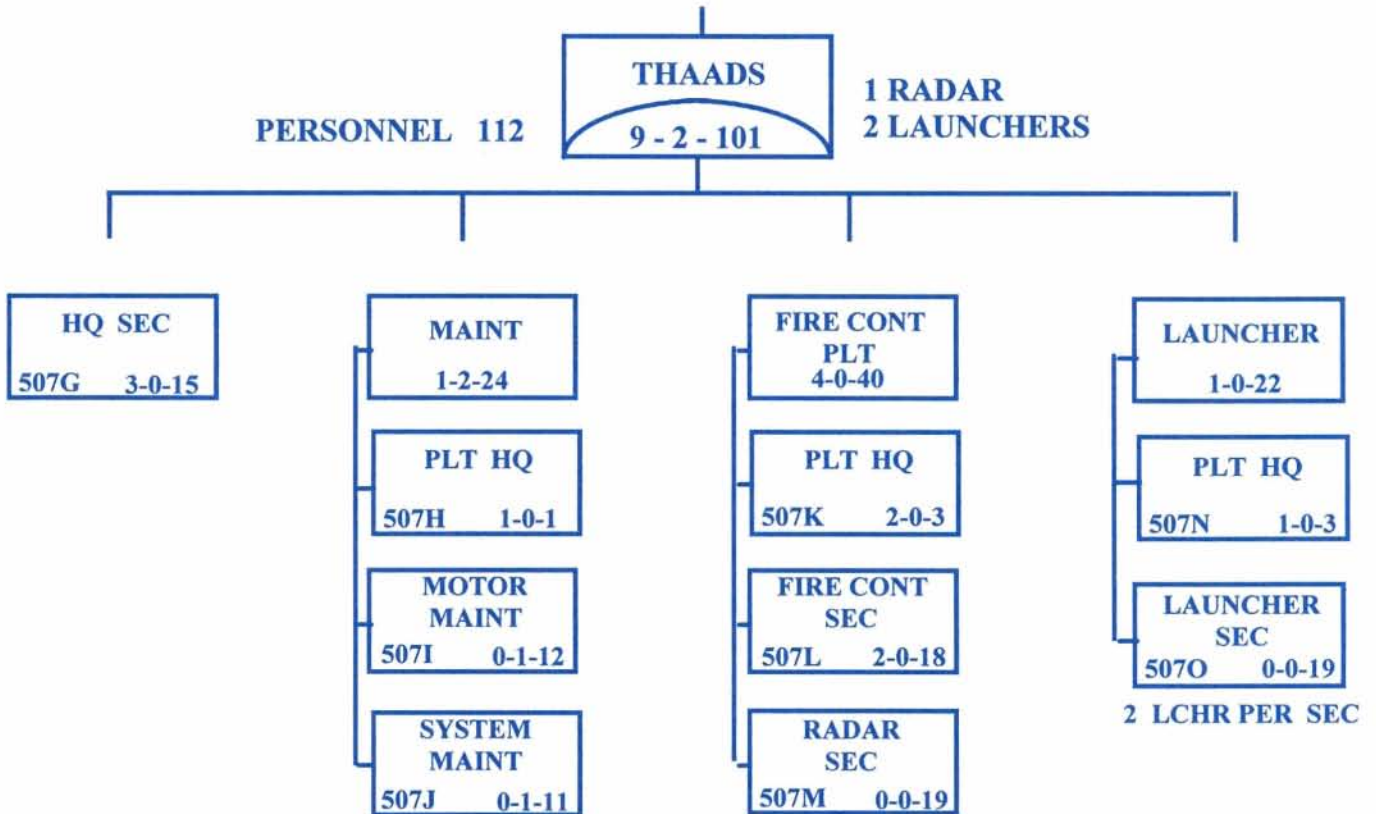
UOES Battalion. The Army has authorized 295 soldiers for a UOES battalion organization forming in FY96. To date, 167 soldiers have been assigned to 1-6 ADA, the first THAAD battalion, commanded by Lt. Col. Dennis Dingle. The Army activated the first THAAD battery, B/1-6 ADA, commanded by Capt. Terry Dorn, on June 6, 1995, at Fort Bliss, Texas. The initial contingent of UOES soldiers assigned to the battery are stabilized to provide continuity during the system flight tests. A new military occupational specialty for THAAD is being studied. Until a decision is finalized sometime in the 1998

time frame, the UOES battalion air defense positions will be Patriot 16Ts and 24Ts.

Objective Battalion. The Army will field two THAAD battalions in the 2002-2005 time frame. Both will be stationed at Fort Bliss. Construction on the first motor pool will begin in April 1996. In December 1994, the Vice Chief of Staff of the Army approved a THAAD battalion design strength not to exceed 700 personnel. As THAAD progresses through testing with soldiers, the organization structure will mature and re-

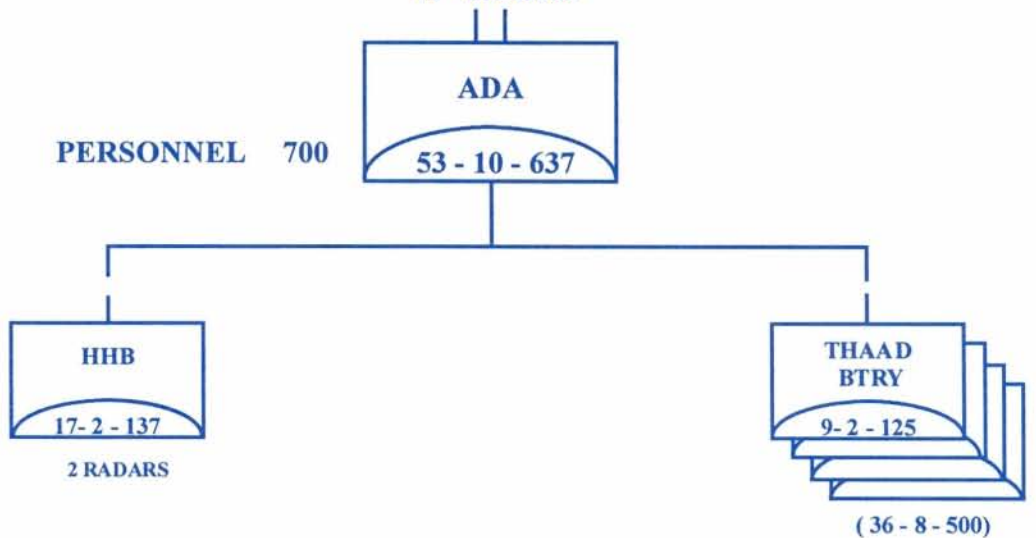
THAAD BTRY (UOES)

TCW1D2AA - 0296



THAAD OBJECTIVE BN

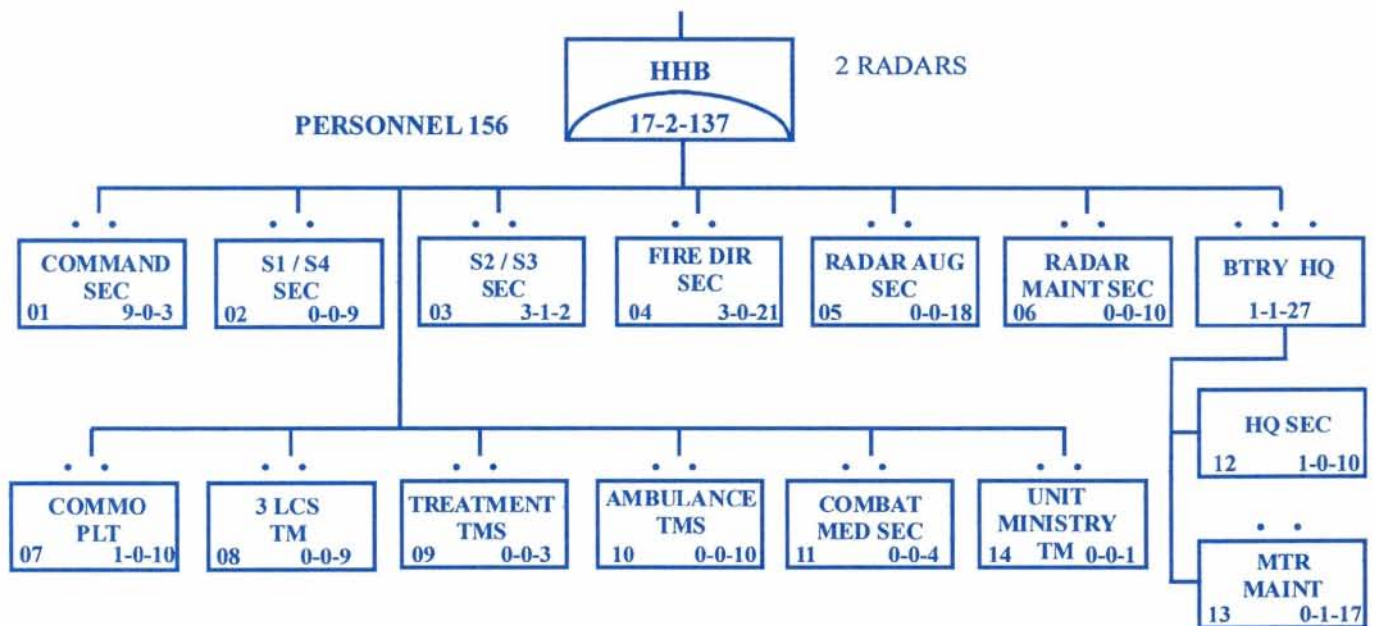
44 - 695L000



4 RADARS - 1 PER BTRY
36 LCHRS - 9 PER BTRY

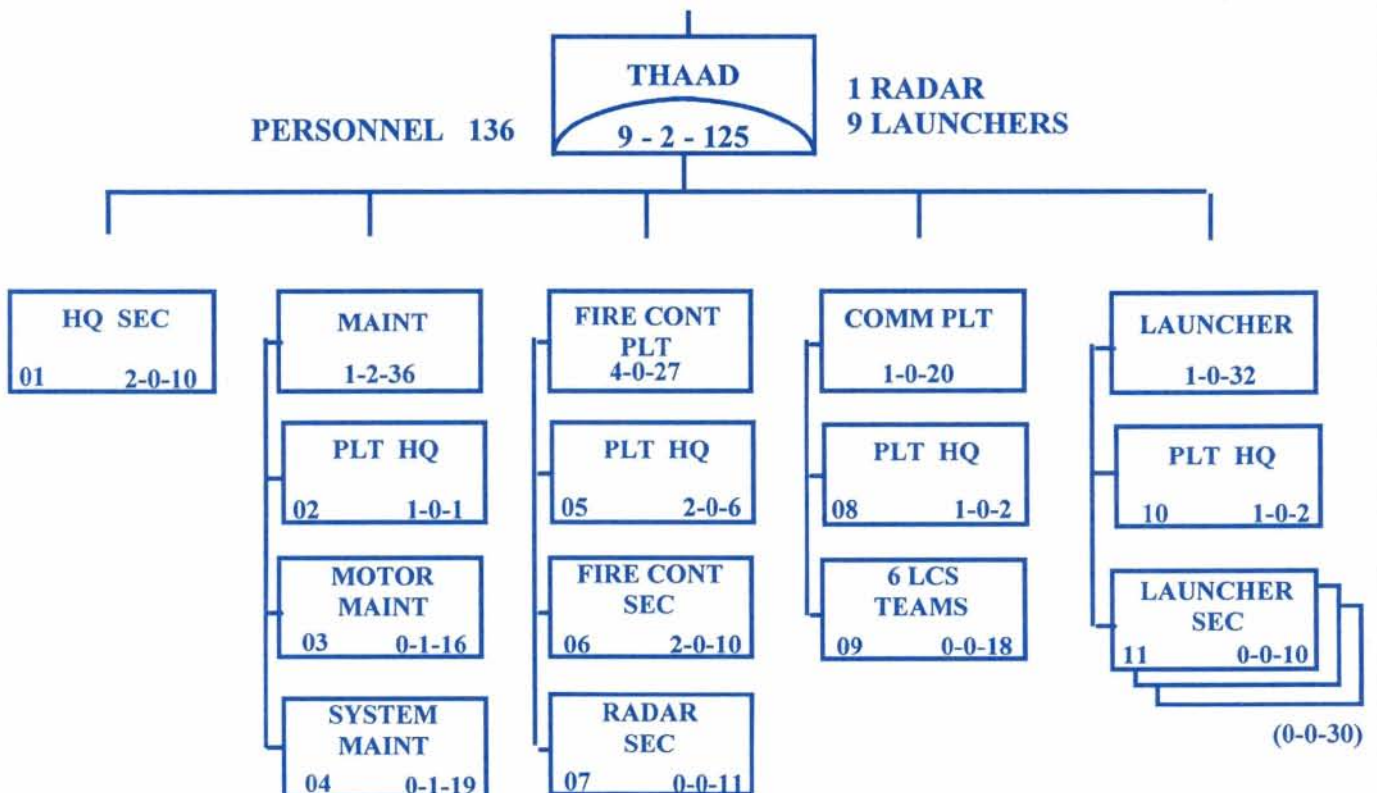
THAAD OBJECTIVE HHB

44 - 696L000

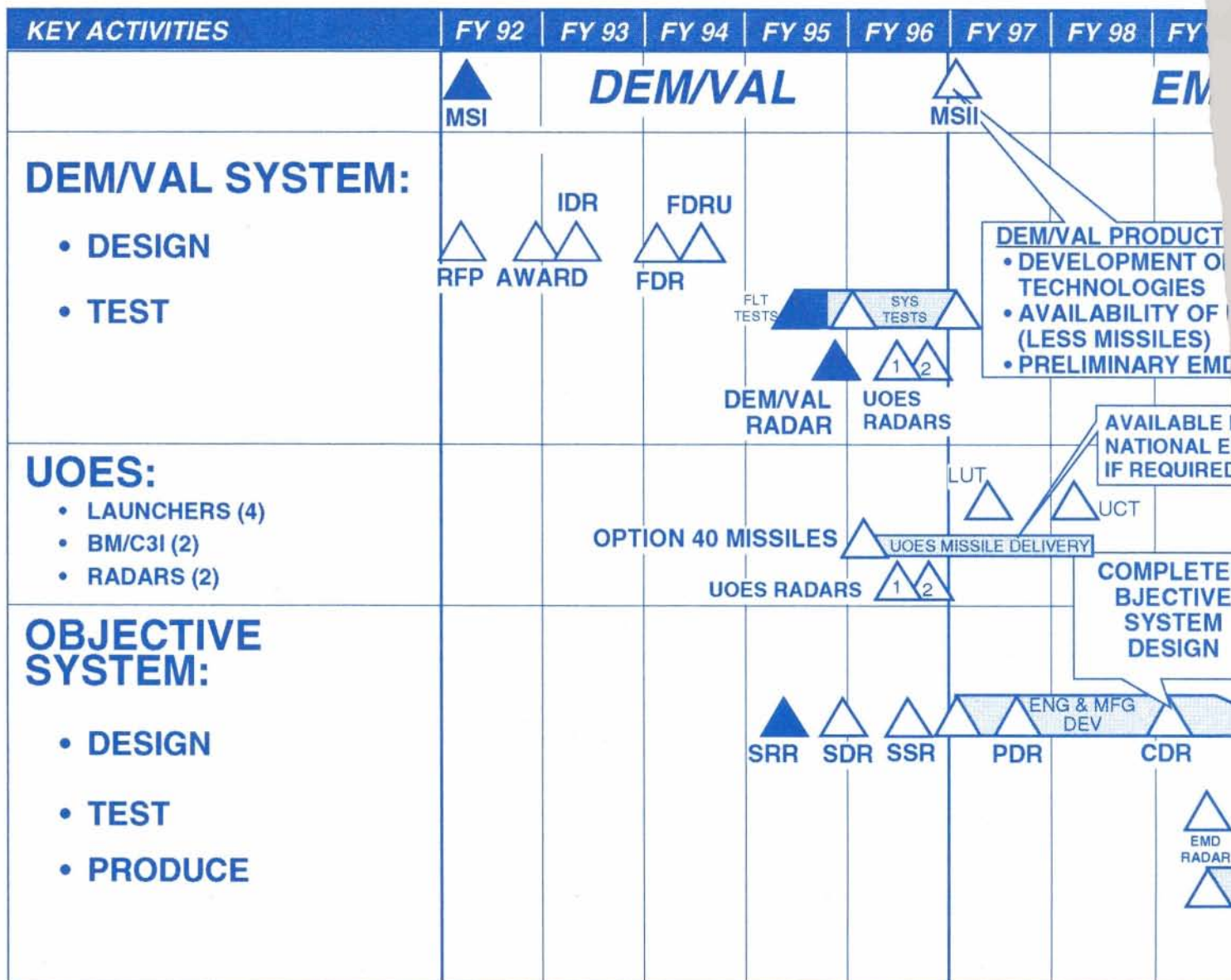


THAAD OBJECTIVE BTRY

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THAAD PROGRAM SCHEDULE



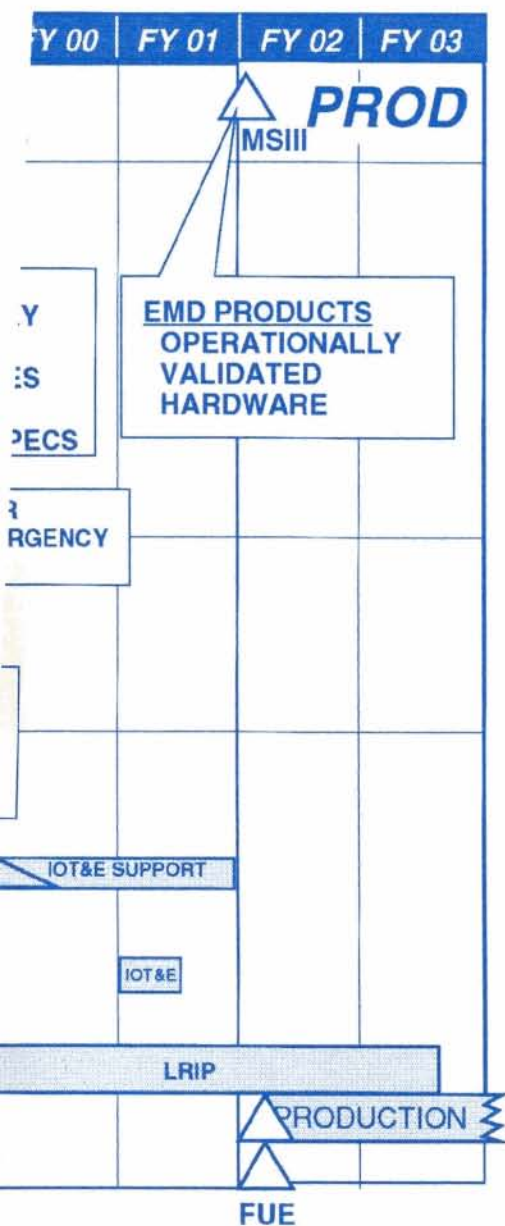
ceive full table of organization and equipment definition.

TRAINING

The training concept for THAAD incorporates institutional training for initial military occupational specialty training with new course development for the operator, maintainer, staff and commander. This concept reflects the

long-range training plans of the Army, U.S. Army Training and Doctrine Command and U.S. Army Air Defense Artillery School. THAAD system training will consist of institutional, unit and self-development training. Institutional and unit sustainment training will require new training devices at Fort Bliss to support the THAAD system. Unit training will use

the embedded trainer and allow operators to maintain their proficiency in tactical decision-making procedures and console operation through air defense battle and distributed interactive simulation networks. The embedded training will be interoperable through the synthetic theater of war architecture to link the live, virtual and constructive pieces of the training arena.



PROGRAM ACTIVITIES

The THAAD program represents the most advanced, high-tech weapon system in the world that will deal with the emerging tactical ballistic missile threat. To date, it has enjoyed a host of successes that can be expected to lead to a superior weapon system.

- The first THAAD battery (B Battery, 1-6 ADA) was formed on

June 6, 1995, and now has 167 troops on board.

- THAAD test operator training was completed Aug. 18, 1995. Forty-six soldiers graduated from these initial courses.

- 1-6 ADA soldiers are currently involved in War Game 95B, a joint forces exercise designed to aid the development of command and control doctrine and the interaction of THAAD units with joint forces on the theater battlefield. Future wargames include interaction with the United Kingdom and Russia.

- Test preparations are underway to conduct the fourth missile firing, tentatively scheduled for December 1995.

- The following THAAD equipment has been delivered to Fort Bliss, Texas and/or White Sands Missile Range for use in testing and training: THAAD launcher, THAAD radar (antenna equipment, cooling equipment unit, electronics equipment unit and operator control unit) and two tactical station groups, each consisting of one tactical operations station and one launcher control station.

- All current activities are leading toward a Milestone II decision that will take place in the first quarter of FY97.

- A complete UOES battalion is scheduled for early FY97. The ultimate milestone is to equip and activate the first objective battery in 2002.

ADA is adding both firepower and advanced capabilities to the force with THAAD. When THAAD arrives on the battlefield, the threat to the force from theater ballistic missiles will be significantly reduced. THAAD technology represents Air Defense Artillery's entry into the 21st century. Soldiers entering Air Defense Artillery today can look forward to the opportunity to serve in this advanced weapon system. THAAD will be the dominant force in the high frontier, engaging incoming theater ballistic missiles well above the battlefield.

Again, Air Defense Artillery conquers the threat — FIRST TO FIRE!

... The new guys put on their protective gear and head for the bunkers each time the alarm sounds, but you can tell they take THAAD pretty much for granted. Back in '91, when all we had was Patriot, you could see the Scuds descending, hear the thunder of Patriot missiles being launched and see the Patriot missiles streaking into the night sky. Then you'd see the flash and hear the boom of the actual intercept. It was like two lightning bolts colliding.

They tell us that Scuds are nothing compared to today's theater ballistics missiles. Scuds were so inaccurate that even the Iraqis had to watch CNN to know where they landed, but they tell us today's theater ballistic missiles are a hundred times more accurate. Scuds, you might say, were more or less addressed to "whom it may concern," but today's theater ballistic missiles, except for THAAD, would come "certified delivery, signature required."

One of these nights, they tell us, the Patriot batteries may have to engage missiles that slip through the THAAD defense, and then we'd see some Gulf War-type fireworks. That, for sure, would get the adrenaline flowing, but I, for one, don't miss the "good ole days."

Maj. Ralph F. Merrill is the THAAD team chief in the TRADOC System Managers Office for Theater Missile Defense. He graduated from the University of Florida with a BS in computer science (engineering) and holds a Masters of Business Administration from the University of Alabama. Maj. Chuck Nickey is a support contractor for the THAAD Project Office in Huntsville, Ala. He served nine years on active duty in both high- to medium-altitude and short-range air defense.

COLUMN WRITE

A 21st Century Approach to Soldier Care



During the Gulf War, Patriot crews shared a media spotlight formerly monopolized by tank commanders, fighter jocks and carrier pilots. It was a taste of the future. Battle tanks and attack helicopters were the Army's dominant weapon systems during the latter half of the 20th century, but theater missile defense systems — such as Air Defense Artillery's new THAAD — are poised to become the Army's dominant weapons of the 21st century.

This issue of ADA magazine focuses on theater missile defense in general and on the Theater High-Altitude Area Defense (THAAD) system in particular. THAAD is the "silver bullet" of theater missile defense, the system that, along with Patriot, will provide Force XXI a near-leakproof defense against tomorrow's dominant threat, the growing proliferation of theater ballistic missiles.

The soldiers of B Battery, 1st Battalion, 6th Air Defense Artillery, the first THAAD user operational evaluation system battery, are featured on this

issue's front cover along with the new weapon system. We can count on THAAD technology. And we can rely on the officers, NCOs and enlisted soldiers of B/1-6 ADA to set THAAD standards of excellence. But B/1-6 ADA is more than just a test battery for a new weapon system; it's also the ADA laboratory for the new Army Family Team Building concept.

THAAD wouldn't be much of a challenge if it were only a new system being tested and evaluated. Neither would deploying THAAD be much of a challenge if it were only a new system, not soldiers, being deployed. THAAD is a challenge because it will test our ability to recruit, train, deploy and, over the long term, retain soldiers assigned to one of the Army's toughest jobs.

THAAD will create welcome new career opportunities for ADA soldiers, producing new additional skill identifiers and, perhaps, an entirely new military occupational specialty. But THAAD soldiers will likely face frequent deployments similar to those that, since the Gulf War, have taken their toll on Patriot soldiers. B/1-6 ADA conducts classes for spouses to alert them to the pressures being part of a theater missile defense unit entails. And relieving the pressure on our thinly spread theater missile defense force is, as Maj. Gen. John Costello indicates in this issue's "Intercept Point," top priority. Part of the solution is likely to be a compromise between increasing the number of theater missile defense units or decreasing the frequency of deployments. ADA NCOs will play little part in the high-level decision-making that will produce a balance between theater missile

defense supply and demand, but they are the long-term solution. ADA NCOs create the "quality of life" that attracts soldiers to Air Defense Artillery, convinces them that the sacrifices they make are worthwhile and keeps them in the Army.

The Army is growing smaller, but so is the demographic base from which we draw recruits. Force XXI emphasis quality over quantity. If we are to continue to attract the type of soldiers we need to field highly sophisticated theater missile defense systems as well as highly sophisticated forward area air defense system, we must continue to improve the quality of life enhancements that are already transforming Army life. We've made tremendous strides over the past few decades in improving quality of life for Army families, now it's time to do the same for single soldiers. We can no longer afford to take single soldiers for granted.

This is why 1st Sgt. Jessie Ruelas of B/1-6 ADA is working hard to integrate the Army Family Team Building concept into every phase of his battery's activities and why he's determined to make his battery the Fort Bliss, Texas, single soldier quality of life model battery. It's why B/1-6 ADA is a battery "under the gun." A lot more than the future of a new weapon system is at stake. As it perfects tactics, techniques and procedures for the silver bullet of air defense, B/1-6 ADA is establishing a new, 21st century approach to soldier care.

James E. Walthes
Command Sergeant Major

ADA DIGEST

UNIT NEWS

Guard Units Manage Air War

The skies over Northern Florida became the stage of a major air battle as members of the Florida and Georgia National Guards and the active duty Air Force, Navy and Marine Corps took part in an unprecedented multiservice ADA training exercise.

The training included mock air attacks as Georgia Air guardsmen and Florida ADA guardsmen directed Chaparral and Hawk missile batteries at Camp Blanding National Guard Training Site to defend the Florida peninsula against planes and helicopters from active duty units simulating an invasion from the north.

A Georgia Air National Guard airspace control squadron and ADA units of the Florida National Guard on annual active duty training were pitted against U.S. Air Force B-52 bombers, U.S. Marine Corps FA-18 fighterjets, U.S. Navy S-3 Vikingjets, Navy Seahawk helicopters and Florida Air National Guard OH-59 Kiowa and AH-64 Apache attack helicopters.

This first-of-its-kind exercise tested the abilities of the Army and Air National Guard units to work together in managing an air war — a task they would likely be assigned if activated during wartime.

"All these units have trained to do this mission," said Maj. Tim Sullivan, assistant operations officer for the 164th ADA Brigade, Florida National Guard. "But this is the first time we've

had the chance to bring them all together and see how well they do against live air attacks."

The Florida and Georgia National Guard units worked together to track target aircraft on radar as they took off from as far away as Beaufort, S.C., and Barksdale, La. As the planes and helicopters closed in on targets at Camp Blanding and southward, Guard air battle managers coordinated with ground missile batteries to track and simulate shooting down the attacking aircraft.

The exercise was a tremendous example of coordination and interoperability between services, said Brig. Gen. John Bridges, commander of the 164th ADA Brigade.

"The crucial aspect of this battle-focused training was the teamwork between the Florida Army National Guard units and the Georgia Air National Guard unit," Bridges said. "It's important because we structured this exercise to exactly replicate the type of interface that would be required in a modern-day scenario."

"This was exactly what we're supposed to be able to do, and we did it well, but the success of the exercise is not as important as the training experience and the things we learned putting it together."

The 117th Airspace Control Squadron, Georgia Air National Guard, played a crucial role in the exercise. The unit employed newly fielded, state-of-the-art TPS-75 radar aircraft tracking equipment to identify and track live aircraft within a 200-mile radius of Camp Blanding, relaying the information to Florida Guard ADA units with missile batteries in the field, said Lt. Col. Vernon Martin, com-

mander of the 117th ACS from Savannah, Ga.

"This is kind of a shake-down cruise for us on this new equipment," Martin said. "It's a great opportunity for us to see how this will work in a combat situation when we have to communicate with various active and reserve forces units."

Chaparral and Hawk ADA units in the field at the 70,000-acre Camp Blanding were able to pick up the aircraft from the 117th via the 164th ADA Brigade's tactical operations center and track them until they were within firing range.

The realism of using live military aircraft added an awesome dimension to this training for all units participating, Bridges said. Guardsmen operating the ADA equipment agreed.

"The live tracks made it incredibly realistic," said AN/TSQ-73 crew chief SSgt. Ray Hewitt of Headquarters and Headquarters Battery, 164th ADA Brigade. "They used unpredictable avenues of approach and forced us to get things done on much tighter time schedules."

The exercise allowed many units to break new ground in combat readiness and, with help from the Florida National Guard's 53rd Signal Brigade, test new communications technologies.

"This has been an extremely valuable exercise for the crew," Hewitt said. "We worked directly with the ACS — something we had not done before. We also laid fiber-optic communications links with the ACS for the first time."

A Hawk unit participating also connected directly with the ACS for the first time. "This was the first time the battalion has directly interlaced with an echelon above corps Air Force ACS," said SFC Ernst Holzhausen of 2-265 ADA. "We also entered a new era in communication with fiber-optic links."

The Hawk battalion's direct connection to the ACS allowed it to remain

operational and connected to the big picture of the air battle if the brigade's tactical operations center became inoperable, Holzhausen said.

More than 1,000 guardsmen and women from units around Florida and Georgia participated in the exercise.

1ST LT. JOHN DAIGLE JR.

SSgt. Ray Hewitt supervises Spec. Lloyd Cook as he tracks an attacking FA-18 during the simulated air war. Below, Florida Guardsmen of 3-265 ADA roll into position at Camp Blanding.



Tribute to 10th ADA Brigade

In recent months, the U.S. Army Air Defense Artillery Center, Fort Bliss, Texas, has initiated the "regimental window" project to recognize active ADA regiments and remember recently inactivated air defense units. Among the units to be honored is the 10th ADA (Prima) Brigade, which inactivated July 15, 1992, in Darmstadt, Germany, under the command of Col. E. Paul Semmens, the brigade's 19th commander.

Upon notification of this program, former Prima Brigade members, under Semmens' direction, began organizing an effort to collect funds to design and commission a stained glass window to commemorate the achievements of the brigade and its soldiers. The window will take its place among other stained glass windows already on display in the ADA Center's headquarters building. Points of contact have been established at several posts, but Semmens hopes to give former members in ADA units around the world a chance to contribute to the project.

"I think it's important that the men and women who stood astride the Fulda Gap for 40 years to confront communism, and who defended freedom in Israel and Saudi Arabia, have the first chance to personally contribute to this project," said Semmens, now commander of U.S. Army Space Command (Forward). "Serving with the Prima Brigade was the most challenging and rewarding assignment many of us had in the Army. I think it would be 'hooah' if the brigade could come together and make it happen like we did in Giessen, Wildflecken, Hanau, Giebelstadt, Tel Aviv, Dhahran and Riyadh."

Former Prima Brigade members are encouraged to send their donations along with their names, the designation of the unit they were assigned to while in the Prima Brigade, as well as the years

of assignment to 1st Lt. Christina Olinger, 2 Sugar Mill Drive, Savannah, GA 31419. Suggested donation amounts are \$5 for enlisted soldiers, \$10 for NCOs and \$20 for officers. Make

checks payable to the Prima Window Fund. For more information, call Olinger at 912-920-7265 or beeper 1-800-604-0785, or direct your questions to Semmens at 719-554-8888 or DSN 692-8888.

1ST LT. CHRIS OLINGER

NOSTALGIA

A Great Army Invention

It was developed in just 30 days in the summer of 1942 by the Subsistence Research Laboratory in Chicago. And never in its 55-year-old history has it ever been known to break, rust or need sharpening or polishing, which is why many soldiers past and present have come to regard the P-38 C-Ration can opener as one of the greatest Army inventions ever.

C-Rations have long been replaced with the more convenient meals ready to eat, but the phenomena of the P-38 continues to rise due to the 1,000 and other uses stemming from the unique blend of ingenuity and creativity all soldiers seem to have.

"The P-38 is one of those tools you keep and never want to get rid of," said Sgt. Scott Kiraly of Fort Monmouth, N.J. "I've had my P-38 since joining the Army 11 years ago and kept it because I can use it for a screwdriver, knife, anything!"

MSgt. Steve Wilson, proponent NCOIC in the Army Chief of Chaplain's Office in the Pentagon, believes it's the size of the P-38 that counts.

"It's a perfect inch and a half, making it a great marking tool," said Wilson.

"Because it's small, it doesn't take up a lot of space, and that's essential in Army life. The conveniently drilled hole in the top half means that the P-38 can be put on a key ring or dog tags and go anywhere."

The P-38 became a strategic learning tool for West Point cadets Rob and Ryan Kay while growing up in Gilroy, Calif. Generously supplied with military gear by their father, the brothers spent many of their adolescent years decked out in fatigues, camouflage makeup, combat gear and P-38s attached to dog tags to play "Army."

"I think the P-38 is as natural to me as my desire to be in the service," Rob Kay said.

The most vital use of the P-38, however, is the very mission for which it was designed. "When we had C-Rations it was your access to food," explains retired Army Col. Paul Baerman. "Then soldiers discovered it was an extremely simple, lightweight, multipurpose tool. I think in warfare, the simpler something is and the easiest access it has, the more you're going to use it. The P-38 had all of those things going for it."

38 USES FOR THE P-38 by MSgt. Steve Wilson

Can opener	Seam ripper
Screwdriver	Clean fingernails
Cut fishing line	Open paint cans
Window scraper	Scrape around floor corners
Digging	Clean groove on Tupperware lids
Reach in/clean out small cracks	Scrape around edge of boots
Bottle opener	Gut fish (in the field)
Campfire "doneness" baking test	Scale fish (in the field)
Prying items	Strip wire
Scrape pans (in the field)	Lift key on flip-top cans
Chisel	Barter
Marking tool	Deflating tires
Clean soles of boots/shoes	Pick teeth
Measure	Strike flint
Stir coffee	Puncture plastic coating
Knock on doors	Morse code
Box cutter	Open letters
Write emergency messages	Scratch an itch
Rip off rank for on-the-spot promotion	Save as a souvenir

The P-38 acquired its infamous nomenclature from the 38 punctures around the C-Ration can required for opening, and the boast it performed with the speed of the World War II P-38 fighter plane.

"Soldiers just took to the P-38 naturally," said World War II veteran John Bandola. As a master sergeant serving in the 30th Signal Construction Battalion in North Africa, Bandola began his acquaintance with the P-38 in 1943.

"The P-38 was our means for eating 90 percent of the time, but the next thing I knew we were using it for cleaning boots, fingernails, screwdrivers, you name it. And we all carried it on our dog tags or key rings."

When PFC Martin Kuehl of Tomah, Wis., stormed Omaha Beach on D-Day 51 years ago with the Third Army's 457th Anti-Aircraft Battalion, he not

only carried several pounds of equipment but a P-38 as well.

"I used it to open cans for dinner on that longest day," Kuehl said. Seven years later millions of these miniature can openers were distributed by the Army during the Korean War. "You weren't going to eat any other way," Korean veteran Jay Welsh recalled. And while fighting in Korea on what soldiers referred to as "Papasan Mountain" with the 24th Infantry Division, Welsh discovered another vital use for the P-38.

"A clean weapon is your immediate priority because a dirty one is not going to work," said Welsh. "The P-38 was the ideal tool to field strip and clean the finer components of the M-1 rifle. So in a way, I believe that two-piece hinged device saved my life. It provided me with a rifle I knew would fire."

Department of Defense police supervisor Ted Paquet came home to Pennsylvania after surviving 12 months of the Vietnam War, and while driving down Route 60 with older brother Paul (another Vietnam veteran) suddenly suffered car trouble.

"There were no tools in the car and, almost simultaneously, both of us reached for P-38s attached to our key rings," Paquet chuckled. "We used it to adjust the flow valve; the car worked perfectly, and we went on our merry way."

Christmas of 1969 brought a truce in Vietnam. Baerman was then a wounded first lieutenant, whose only desire was to reunite with his platoon in time for the holiday. His wish was granted, and it remains one of the most memorable times of his military career.

"One of my soldiers received one of those evergreen foil trees," recalled Baerman. "It didn't come with anything so we mounted it on top of a .50-caliber machine gun on an armored vehicle, and decorated it with brass shells from ammunition, C-Ration cans and, of course, P-38s. They were a little dull, but that hole made them perfect hanging ornaments. Whenever I see that little can opener, I remember singing carols around a P-38 decorated Christmas tree."

Memories like these best depict the sentimental attachment many soldiers came to feel for the P-38. When Bandola attached his first and only P-38 to his key ring half a century ago, it accompanied him to Anzio, Salerno and Northern Italy. It was with him when World War II ended and it's with him now.

"This P-38 is a symbol of my life back then," Bandola said. "The Army, the training, my fellow soldiers, all those incredible adventures we shared."

Bandola plans to leave his P-38 to his son and grandson. It's a desire his wife, Dorothy, understands perfectly.

"Every time they look at that P-38, they'll see and remember him."

ARMY NEWS SERVICE

ADA Association

by Col. Charles W. Hurd Jr.
Executive Director
U.S. Army Air Defense Artillery Association

The Air Defense Artillery Museum, Fort Bliss, Texas, recently opened the final exhibit of its World War II commemorative exhibit series. Previous exhibits included the Battle of Britain, Fort Bliss mobilization, the war in the Pacific, combat art and D-Day. The new exhibit, titled "Victory and Peace: The Legacy," celebrates the end of World War II and shows how the war's technological developments changed America's life-style. The exhibit, which runs through the end of December, focuses on the period from April 1945, Victory in Europe Day, to April 1947, the beginning of the Cold War. It features artifacts and photos that documents the enormous changes brought about by demobilization, the end of wartime rationing and the advent of the Atomic Bomb.

The Victory and Peace exhibit recreates the era in which Air Defense Artillery was just beginning to explore new technology that would soon replace antiaircraft guns with surface-to-air missiles. It dramatically demonstrates the vital role the ADA Museum plays in preserving the cherished heritage and traditions of the "First to Fire" branch. The exhibit also explains why supporting the ADA Museum remains a top ADA Association priority.



Fort Bliss Museums Division director, Sam Hoyle, shows Col. Terry L. Scott through the ADA Museum's Victory and Peace exhibit.

Last year, the ADA Association launched a capital campaign to raise funds for a new museum complex. The campaign to give the museum's talented and dedicated staff a showcase that will serve as a source of pride and inspiration for air defenders has drawn strong support from the Fort Bliss-El Paso community, and we are aggressively exploring new avenues of funding.

The capital campaign recently gained momentum when your ADA Association recruited Bettie Beckworth to fill the newly created position of executive director of development. Ms Beckworth, who is a specialist in pursuing grants, will work full time to raise funds for the ADA Museum Building Fund. She has set high goals, and we are confident she will play a major role in making the capital campaign a success.

Meanwhile, air defense soldiers and units continue to support the capital campaign. Members of the Third Platoon, Officer Basic Course Class 3-95, and their spouses recently sponsored a bake sale in the hallways of the U.S. Army Air Defense Artillery Center, Fort Bliss, Texas, to raise money for the ADA Museum Building Fund. The bake sale, organized by 2nd Lt. Ken O'Donnell, raised \$240. The initiative shown by second

lieutenants who have only recently pinned on ADA insignia serves as a shining example to other ADA soldiers of branch esprit in operation.

If you are stationed in the Fort Bliss-El Paso area, it's easier than ever to do your part to help make ADA Association projects a success. Simply earmark your 1995 Sun Country Combined Federal Campaign (CFC) donations for the ADA Association. Be sure to enter No. 3424 on your CFC donation form!



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